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ADDENDUM TO THE BASELINE RISK ASSESSMENT UMATILLA DEPOT ACTIVITY HERMISTON, OREGON

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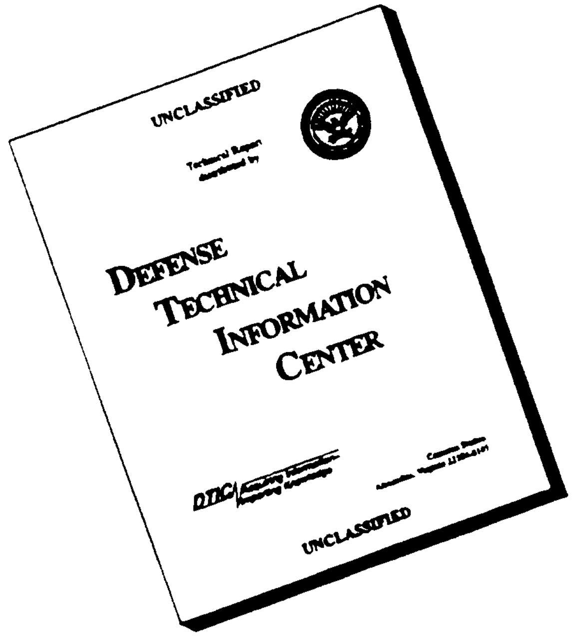

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The Addendum to the Baseline Risk Assessment (RA) has been prepared for the U.S. Army Environmental Center (USAEC), to discuss the results of additional investigations at existing RI study sites at Umatilla Depot Activity (UMDA), Hermiston, Oregon.

The Addendum to the Baseline RA is prepared in support of the Remedial Investigation/Feasibility Study (RI/FS) of the follow-up field program at 16 UMDA RI/FS study sites to verify and characterize environmental contamination at the study sites in terms of potential impacts on human health under current and future land use conditions. This addendum assesses the potential present and future health risks and hazards posed by contaminants in soil and groundwater in the absence of remediation, and develops preliminary remediation goals for these media if remediation is determined to be required.

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LIST OF ACRONYMS AND ABBREVIATIONS

ADA	Ammunition Demolition Activity
ALA	Amino leuvinilic acid
ATSDR	Agency for Toxic Substances and Disease Registry
BNAs	Base-neutral and acid extractable organics
BRAC	Base realignment and closure
CAS	Chemical Abstract Service
CDC	Centers for Disease Control
CPRG	Combined preliminary remediation goal
DOD	U.S. Department of Defense
EPA	U.S. Environmental Protection Agency
HEAST	Health Effects Assessment Summary Tables
IQ	Intelligence quotient
IRIS	Integrated Risk Information System
LOAEL	Lowest observed adverse effects level
$\mu g/g$	Micrograms per gram
$\mu g/L$	Micrograms per liter
$\mu g/dL$	Micrograms per deciliter
$\mu g/m^3$	Micrograms per cubic meter
MCL	Maximum contaminant level
mg/kg	Milligrams per kilogram
mg/m^3	Milligrams per cubic meter
NCP	National Contingency Plan
nm	Nanometer
NOAEL	No observed adverse effects level
NOEL	No observed effects level
OD	Open detonation
ORD	Office of Research and Development (EPA)
PAH	Polynuclear aromatic hydrocarbon

LIST OF ACRONYMS AND ABBREVIATIONS (cont'd)

PCBs	Polychlorinated biphenyls
ppm	Parts per million
PRG	Preliminary remediation goal
QA/QC	Quality assurance/quality control
RA	Risk Assessment
RAGS	Risk Assessment Guidance for Superfund
RfD	Reference dose
RI/FS	Remedial Investigation/Feasibility Study
SMCL	Secondary maximum contaminant level
TAL	Target Analyte List
TCL	Target Compound List
TCLP	Toxicity characteristic leaching procedure
TIC	Tentatively identified compound
TPHC	Total petroleum hydrocarbons
UBK	Uptake/biokinetic model
UCL	Upper confidence limit
UMDA	Umatilla Depot Activity
USAEC	U.S. Army Environmental Center
USATHAMA	U.S. Army Toxic and Hazardous Materials Agency
USPHS	U.S. Public Health Service
UXO	Unexploded ordnance
VOA	Volatile organic analyte
VOC	Volatile organic compound

EXECUTIVE SUMMARY*

ES.1* INTRODUCTION

This document is an addendum to the Final Baseline Risk Assessment (Baseline RA) for the Remedial Investigation/Feasibility Study (RI/FS) at the Umatilla Depot Activity (UMDA), Hermiston, Oregon. It is prepared for the U.S. Army Environmental Center (USAEC; formerly the U.S. Army Toxic and Hazardous Materials Agency (USATHAMA)) under Contract No. DAAA15-88-D-0008, Delivery Order No. 10. The Baseline RA was conducted in support of the RI/FS for UMDA to verify and characterize environmental contamination at the study sites in terms of potential impacts on human health under current and future land use conditions.

ES.1.1 Purpose of RA Addendum

The purpose of the addendum to the Baseline RA is to evaluate the results of additional field investigations at 16 UMDA sites--Sites 2, 5, 11, 12, 15, 17, 18, 19, 22, 26, 30, 36, 44 Location II, 47, 48, and 50. This addendum assesses the potential present and future health risks posed by contaminants in soil and groundwater in the absence of remediation. Preliminary remediation goals (PRGs) were developed for these media if remediation was determined to be required.

ES.1.2 Addendum Report Organization

The general risk assessment process is described in Section ES.1.2 of the Baseline RA and is not repeated herein. Installation background information and site descriptions are provided in Section ES.2 of that report.

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*The sections of the addendum marked with an asterisk correspond to the same numbered sections in the Baseline RA. A section with no asterisk is new to this addendum. The absence of a section in the addendum (e.g., ES.2) means that the corresponding section in the Baseline RA is not affected by the additional field investigations. The same pattern is followed for figures and tables, except that new figures and tables are designated by the appropriate sequence number plus an A, B, etc. (e.g., Table 6-185A).

This addendum includes the following sections and supporting appendices:

- Section 1.0*--An introduction that presents the outline and purpose of this addendum.
- Section 3.0*--Data evaluation and identification of contaminants of concern for the 16 sites that are part of the followup field investigation.
- Section 4.0*--A summary of the environmental fate and transport properties of the contaminants of concern, including three new contaminants of concern--benzo(a)pyrene, benzo(g,h,i)perylene, and indeno(1,2,3-cd)pyrene.
- Section 5.0*--A summary of the toxicity criteria for the contaminants of concern, including the three new contaminants of concern listed above.
- Section 6.0*--Exposure assessment.
- Section 7.0*--Risk characterization and an evaluation of uncertainties.
- Section 8.0*--Development of PRGs.
- Section 9.0*--Summary and conclusions.
- Appendix C*--Environmental fate and transport profiles for the three new contaminants of concern.
- Appendix E*--Air modeling of fugitive dust concentrations for those sites for which the dust inhalation scenario is applicable because of surface soil sampling results.

The reference list (Section 10.0) and Appendices A, B, and D from the Baseline RA are unchanged and are not repeated in this addendum.

ES.3* DATA EVALUATION AND IDENTIFICATION OF CONTAMINANTS OF CONCERN

The purpose of contaminant identification is to evaluate the chemicals detected in the various site media to identify the contaminants of concern (i.e., those contaminants that potentially pose public health risks). Every effort was made to sample sites and media that potentially pose the most significant contamination or exposure problems. Soil and groundwater data collected from 16 sites are included in this addendum.

The criteria used to determine the potential contaminants of concern for the followup fieldwork sites are the same as those described in Section ES.3 of the Baseline RA.

Of previous analytical data available for UMDA, only data from the Weston RI (conducted in 1988) are integrated with Dames & Moore data in the Baseline RA. Collectively, these data represent the most current site conditions, and only Weston and Dames & Moore data were collected and analyzed in accordance with USAEC quality assurance/quality control (QA/QC) procedures. Dames & Moore data include the results of site investigations conducted at 68 sites in 1990 and 1991, as well as the results of the followup field investigation conducted at various sites in 1992. Some data (e.g., toxicity characteristic leaching procedure (TCLP), oil and grease, total petroleum hydrocarbon (TPHC), and pH analyses) collected during the Weston and Dames & Moore investigations are not included in the Baseline RA. TCLP analysis was performed at certain sites primarily to determine whether contaminated soil should be classified as a hazardous waste based on leaching characteristics. Oil and grease and TPHC analyses (e.g., at Site 44 Locations I and II and at Site 50) are useful to determine gross contamination. However, such results are not considered in the Baseline RA, because these analyses include a wide range of possible chemical compounds that may vary from site to site; hence, the sampling results are not directly useful in quantitatively evaluating risks.

Sampling and analytical results for media sampled at each followup fieldwork site are summarized in occurrence and distribution tables in Section 3.0.* Followup fieldwork results did not alter the contaminants of concern for groundwater at Sites 11, 19, and 50--the only three sites at which additional groundwater sampling was conducted. Additional contaminants of concern were identified in shallow and subsurface soil at certain sites based on followup fieldwork results. These results are summarized in Section 3.1.*

ES.4* ENVIRONMENTAL FATE AND TRANSPORT

Appendix C* presents fate and transport profiles for the three new contaminants of concern--benzo(a)pyrene, benzo(g,h,i)perylene, and indeno(1,2,3-cd)pyrene.

ES.5* TOXICITY ASSESSMENT

The purpose of and methodology for toxicity assessment are provided in Section ES.5 of the Baseline RA and are not repeated in this addendum.

The quantitative carcinogenic and noncarcinogenic toxicity values for UMDA contaminants of concern, including the three new contaminants identified based on followup fieldwork results (benzo(a)pyrene, benzo(g,h,i)perylene, and indeno(1,2,3-cd)pyrene), are summarized in Table ES-2.* Table ES-3 of the Baseline RA presents oral absorption factors and toxicity values adjusted for absorption, which do not change based on followup fieldwork results.

ES.6* EXPOSURE ASSESSMENT

The purpose of the exposure assessment and descriptions of the 12 potential exposure pathways identified for current and future receptors are included in Section ES.6 of the Baseline RA and are not repeated in this addendum.

The completeness of these pathways was evaluated for various current and future receptors at or near the 16 followup fieldwork sites. A subset of these pathways was considered complete and was selected for quantitative evaluation. Six

TABLE ES-2*

Summary of Toxicity Criteria for the Contaminants of Concern

Chemicals	RfDo (mg/kg/day)	UF	Confidence	Critical Effect	RfDi (mg/kg/day)(aa)	UF	Confidence	Critical Effect
TAL Inorganics								
Aluminum	1E+00	100	Medium	Developmental neurotoxicity	ND	--	--	--
Antimony	4.0E-04	1000	Low	Longevity; blood glucose levels; serum cholesterol	ND	--	--	--
Arsenic	3.0E-04	3	Medium	Hyperpigmentation, keratosis vascular complications	UR	--	--	--
Barium	7.0E-02	3	Medium	Hypertension	1.4E-04	1000	--	Fetotoxicity
Beryllium	5.0E-03	100	Low	NOAEL; highest level tested	ND	--	--	--
Cadmium	5.0E-04(b) 1.0E-03(b)	10	High	Proteinurea	UR	--	--	--
Calcium	ND	--	--	--	ND	--	--	--
Chromium III(c)	1.0E+00	100(d)	Low	NOAEL; highest level tested	6.0E-07	1000	--	Nasal mucosal atrophy
Chromium VI(c)	5.0E-03	500	Low	NOAEL; highest level tested	6.0E-07	1000	--	Nasal mucosal atrophy
Cobalt	1.0E-05	--	Low	Toxicity assessment in sensitive humans	2.86E-04	--	Low	--
Copper	3.7E-02	1	Low	MCL	ID	--	--	--
Iron	ND	--	--	--	ID	--	--	--
Lead	IUBK Model (see text)			Neurotoxicity in children	ID	--	--	--
Magnesium	ID	--	--	--	ID	--	--	--
Manganese	1E-01	1	Medium	Dietary essential level	1.0E-04	300(e)	Medium	Respiratory signs; psychomotor disturbances
Mercury (inorganic)	3.0E-04	1000	--	Renal toxicity	9.0E-05	30	--	Neurotoxicity
Nickel	2.0E-02(f)	300	Medium	Decreased body, liver and spleen weights	UR	--	--	--
Potassium	ID	--	--	--	ID	--	--	--
Selenium	5E-03	3	High	Selenosis: Mottled teeth, blood and CNS disorders	ID	--	--	--
Silver	5E-03	3	Low	Skin discoloration	ID	--	--	--
Sodium	ID	--	--	--	ID	--	--	--
Thallium	8.0E-05(h)	3000	Low	NOAEL; highest level tested	ND	--	--	--
Vanadium	7.0E-03	100	Low	NOAEL; highest level tested	ND	--	--	--
Zinc	2.0E-01(i)	100	--	Anemia	ND	--	--	--
Cyanide (free)	2.0E-02	100(j)	Medium	Weight loss; thyroid effects; demyelination	ND	--	--	--

TABLE ES-2* (cont'd)

Summary of Toxicity Criteria for the Contaminants of Concern

Chemicals	RfDo (mg/kg/day)	UF	Confidence	Critical Effect	RfDi (mg/kg/day)(aa)	UF	Confidence	Critical Effect
Explosives								
1,3,5-Trinitrobenzene	5.0E-05	10,000	Low	By analogy to 1,3-DNB	ND	--	--	--
1,3-Dinitrobenzene	1.0E-04	3000	Low	NOAEL; higher levels associated with inc. spleen weights, hematological and testicular effects	ND	--	--	--
2,4,6-TNT	5.0E-04	1000	Medium	Liver, circulating blood, testicular damage	ND	--	--	--
2,4-DNT	2.0E-03	100	--	NOAEL; higher levels produced anemia, neurological effects, methemoglobinemia, bile duct hyperplasia	ND	--	--	--
2,6-DNT	1.0E-03	3000	--	Mild splenic hematopoeisis; lymphoid depletion	ND	--	--	--
HMX	5.0E-02	1000	Low	NOAEL: higher levels produced hepatotoxicity and nephrotoxicity	ND	--	--	--
RDX	3.0E-03	100	High	NOAEL; higher levels associated with prostate inflammation, tremors, hepatic and renal effects	ND	--	--	--
Nitrobenzene	5.0E-04	10,000	Low	Based on inhalation data	6.0E-04	10,000	Low	Hemolytic anemia; adrenal cortical cell vacuolation
Tetryl	1.0E-02	10,000	Low	Blood coagulation defects; hepatic lesions and necrosis	ND	--	--	--
Other inorganics								
Nitrate(k)	1.6E+00	1	High	NOAEL; higher doses associated with methemoglobinemia	ND	--	--	--
Nitrite	1E-01	10	High	NOAEL; higher doses associated with methemoglobinemia	ND	--	--	--
TCL Volatiles								
Benzene	UR	--	--	--	UR	--	--	--
Tetrachloroethylene	1.0E-02	1000	Medium	Hepatotoxicity/body weight gain decrements	ND	--	--	--
1,1,1-Trichloroethane	9.0E-02(l)	1000	Low	By analogy to inhalation data	3.0E-01(i)	1000	Low	Hepatoxicity
Trichloroethylene	UR	--	--	--	UR	--	--	--
Xylenes (total)	2.0E+00	100	Medium	Hyperactivity; decreased weight gain; mortality	1.0E-01(m)	100	Low	CNS effects; throat and nose irritation

TABLE ES-2* (cont'd)

Summary of Toxicity Criteria for the Contaminants of Concern

	Chemicals	RfDo (mg/kg/day)	UF	Confidence	Critical Effect	RfDi (mg/kg/day)(aa)	UF	Confidence	Critical Effect
	TCL Semi-Volatiles								
	Anthracene	3.0E-01	3000	Low	NOEL	ND	--	--	--
	Benzo(a)anthracene	ND	--	--	--	ND	--	--	--
**	Benzo(a)pyrene	ND	--	--	--	ND	--	--	--
	Benzo(b)fluoranthene	ND	--	--	--	ND	--	--	--
**	Benzo(g,h,i)perylene	ND	--	--	--	ND	--	--	--
	Benzo(k)fluoranthene	ND	--	--	--	ND	--	--	--
	Bis(2-ethylhexyl) phthalate	2.0E-02	1000	Medium	Increased relative liver weights	ND	--	--	--
	Chrysene	ND	--	--	--	ND	--	--	--
	Dibenzofuran	ID	--	--	--	ID	--	--	--
	Di-n-butyl phthalate	1.0E-01	1000	Low	NOAEL; higher doses associated with mortality	ND	--	--	--
	Fluoranthene	4.0E-02	3000	Low	Nephropathy; increased liver wts.; hematological effects	ND	--	--	--
**	Indeno(1,2,3-cd)pyrene	ND	--	--	--	ND	--	--	--
	2-Methylnaphthalene	ID	--	--	--	ID	--	--	--
	Naphthalene	4.0E-02(i)	1,000	Low	Decreased body weight gain	ND	--	--	--
	N-nitrosodiphenylamine	ND	--	--	--	ND	--	--	--
	Phenanthrene	ND	--	--	--	ND	--	--	--
	Pyrene	3.0E-02	3000	Low	Renal tubular pathology; reduced kidney weights	ND	--	--	--
	Pesticides/PCBs								
	Chlordane	6.0E-05	1000	Low	Focal hepatic hypertrophy	UR	--	--	--
	Dieldrin	5.0E-05	100	Medium	Focal hepatic proliferation and hyperplasia; increased liver weights	ND	--	--	--
	DDD	ND	--	--	--	ND	--	--	--
	DDE	ND	--	--	--	ND	--	--	--
	DDT	5.0E-04	100	Medium	Hepatic hypertrophy	ND	--	--	--
	Endrin	3.0E-04	100	Medium	NOAEL; higher doses associated with liver and neurological effects	ND	--	--	--
	PCB 1260	ND	--	--	--	ND	--	--	--

TABLE ES-2* (cont'd)

Summary of Toxicity Criteria for the Contaminants of Concern

Chemicals	SFo 1/(mg/kg/day)	Types of Cancer	SFI 1/(mg/kg/day)	Types of Cancer	Weight-of-Evidence Class	Sources(a)
TAL Inorganics						
Aluminum	ND	--	ND	--	--	10,1,1,1
Antimony	ND	--	ND	--	--	1,1,1,1
Arsenic	1.75E+00	Skin cancers	1.4E+01	Lung cancers	A	1,1,1,1
Barium	ND	--	ND	--	--	1,2,1,1
Beryllium	4.3E+00	Gross tumors, all sites	8.4E+00	Lung cancers	B2	1,1,1,1
Cadmium	ND	--	6.3E+00	Lung, tracheal, and bronchial tumors	B1	1,1,1,1
Calcium	ND	--	ND	Lung tumors	--	-,-,-,-
Chromium III(c)	ND	--	ND	--	--	1,2,1,1
Chromium VI(c)	ND	--	4.2E+01	Lung tumors	A	1,2,1,1
Cobalt	ND	--	ND	--	--	3,3,1,1
Copper	ND	--	ND	--	D	3,1,1,1
Iron	ND	--	ID	--	--	-,-,-,-
Lead	ID	Renal tumors	ID	Digestive tract; respiratory system; peritoneum	B2	4,4,1,1
Magnesium	ID	--	ID	--	--	-,-,-,-
Manganese	ND	--	ND	--	D	1,1,1,1
Mercury (inorganic)	ND	--	ND	--	D	2,2,1,1
Nickel	ND	--	8.4E-01(g) 1.7E+00(g)	Lung and nasal tumors	A	1,1,1,1
Potassium	ID	--	ID	--	--	-,-,-,-
Selenium	ID	--	ID	--	D	1,1,1,1
Silver	ID	--	ID	--	D	1,1,1,1
Sodium	ID	--	ID	--	--	-,-,-,-
Thallium	ID	--	ND	--	D	1,1,1,1
Vanadium	ND	--	ND	--	--	2,1,1,1
Zinc	ND	--	ND	--	D	2,1,1,1
Cyanide (free)	ND	--	ND	--	D	1,1,1,1

TABLE ES-2* (cont'd)

Summary of Toxicity Criteria for the Contaminants of Concern

Chemicals	SFo 1/(mg/kg/day)	Types of Cancer	SFI 1/(mg/kg/day)	Types of Cancer	Weight-of-Evidence Class	Sources(a)
Explosives						
1,3,5-Trinitrobenzene	ND	--	ID	--	--	1,1,1,1
1,3-Dinitrobenzene	ND	--	ID	--	--	1,1,1,1
2,4,6-TNT	3.0E-02	Urinary bladder carcinomas and papillomas	ID	--	C	1,1,1,1
2,4-DNT	6.8E-01	Hepatocellular carcinomas; mammary fibroadenomas	ND	--	B2	5,1,1,1
2,6-DNT	6.8E-01	Hepatocellular carcinomas; mammary fibroadenomas	ND	--	B2	5,1,1,1
HMX	ID	--	ND	--	D	1,1,1,1
RDX	1.1E-01	Hepatocellular carcinomas/ adenomas	ND	--	C	1,1,1,1
Nitrobenzene	ND	--	ND	--	D	1,2,1,1
Tetryl	ND	--	ND	--	--	6,-,-,-
Other inorganics						
Nitrate(k)	ND	--	ND	--	--	1,1,1,1
Nitrite	ND	--	ND	--	--	1,1,1,1
TCL Volatiles						
Benzene	2.9E-02	Leukemia	2.9E-02	Leukemia	A	1,1,1,1
Tetrachloroethylene	5.1E-02	Hepatocellular carcinomas	1.8E-03	Mononuclear cell leukemias and combined liver tumors	UR	1,1,7,7
1,1,1-Trichloroethane	ND	--	ND	--	D	2,2,1,1
Trichloroethylene	1.1E-02	Hepatocellular carcinomas and adenomas	6E-03	Lung tumors	UR	1,1,8,8
Xylenes (total)	ND	--	ND	--	D	2,2,1,1

TABLE ES-2* (cont'd)

Summary of Toxicity Criteria for the Contaminants of Concern

	Chemicals	SFo 1/(mg/kg/day)	Types of Cancer	SFI 1/(mg/kg/day)	Types of Cancer	Weight-of-Evidence Class	Sources(a)
	TCL Semi-Volatiles						
	Anthracene	ID	--	ID	--	D	1,1,1,1
	Benzo(a)anthracene	5.8E+00	By analogy to benzo(a)pyrene	6.1E+00(n)	By analogy to benzo(a)pyrene	B2	1,1,9,9
**	Benzo(a)pyrene	5.8E+00	Forestomach tumors	6.1E+00(n)	Upper respiratory and digestive tumors	B2	1,1,9,9
	Benzo(b)fluoranthene	5.8E+00	By analogy to benzo(a)pyrene	6.1E+00(n)	By analogy to benzo(a)pyrene	B2	1,1,9,9
**	Benzo(g,h,i)perylene	ND	--	ND	--	D	1,1,1,1
	Benzo(k)fluoranthene	5.8E+00	By analogy to benzo(a)pyrene	6.1E+00(n)	By analogy to benzo(a)pyrene	B2	1,1,9,9
	Bis(2-ethylhexyl) phthalate	1.4E-02	Hepatocellular carcinomas/ adenomas	ND	--	B2	1,1,1,1
	Chrysene	5.8E+00	By analogy to benzo(a)pyrene	6.1E+00(n)	By analogy to benzo(a)pyrene	B2	1,1,9,9
	Dibenzofuran	ID	--	ID	--	--	-,-,-,-
	Di-n-butyl phthalate	ND	--	ND	--	--	1,1,1,1
	Fluoranthene	ND	--	ND	--	D	1,1,1,1
**	Indeno(1,2,3-cd)pyrene	5.8E+00	By analogy to benzo(a)pyrene	6.1E+00(n)	By analogy to benzo(a)pyrene	B2	1,1,9,9
	2-Methylnaphthalene	ID	--	ID	--	--	--
	Naphthalene	ND	--	ND	--	D	11,1,1,1
	N-nitrosodiphenylamine	4.9E-03	Bladder tumors	ND	--	B2	1,1,1,1
	Phenanthrene	ND	--	ND	--	D	1,1,1,1
	Pyrene	ND	--	ND	--	D	1,1,1,1
	Pesticides/PCBs						
	Chlordane	1.3E+00	Hepatocellular carcinomas	1.3E+00	By analogy to oral data	B2	1,1,1,1
	Dieldrin	1.6E+01	Various hepatic tumors	1.6E+01	By analogy to oral data	B2	1,1,1,1
	DDD	2.4E-01	Liver tumors	ND	--	B2	1,1,1,1
	DDE	3.4E-01	Hepatocellular carcinomas and hepatomas	ND	--	B2	1,1,1,1
	DDT	3.4E-01	Hepatocellular carcinomas, adenomas; hepatomas	3.4E-01	By analogy to oral data	B2	1,1,1,1
	Endrin	ND	--	ND	--	D	1,1,1,1
	PCB 1260	7.7E+00	Hepatic carcinomas/adenomas; neoplatic nodules	ND	--	B2	1,1,1,1

TABLE ES-2* (cont'd)

Summary of Toxicity Criteria for the Contaminants of Concern

Footnotes:

(aa) - Inhalation reference doses were calculated from reference air concentrations (RFCs) assuming that a standard 70 kg human inhales 20 cubic meters of air/day (USEPA, 1989b). Limitations of these assumptions are discussed in the uncertainty section of the text.

(a) - Source codes are listed below. The 4 values shown in this column are the sources for the oral RfD, the inhalation RfD, the oral slope factor, and the inhalation slope factor, respectively.

(1) USEPA, 1991d
(2) USEPA, 1991e
(3) USEPA, 1991g
(4) USEPA, 1991k
(5) Brower, 1992
(6) USEPA, 1990
(7) Ris, 1992
(8) Ris, 1991
(9) Poirier, 1992
(10) USEPA, 1992e
(11) USEPA, 1992f

(b) - The oral slope factors are listed for cadmium in water and dietary cadmium, respectively.
(c) - Values for hexavalent chromium are used in this risk assessment.
(d) - A modifying factor of 10 was also used to reflect uncertainty in the data base and the variable absorption of chromium.
(e) - A modifying factor of 3 was also used to account for the uncertainty in manganese exposure levels in the principal study.
(f) - Listed value is for the soluble salts of nickel.
(g) - Listed values are for nickel refinery dust and nickel subsulfide, respectively. Most conservative value (e.g., nickel subsulfide) used in this Baseline RA.
(h) - Value is for thallium as thallium sulfate
(i) - Under RfD/RfC Work Group review.
(j) - A modifying factor of 5 was used to reflect tolerance to cyanide when adminsitered in food.
(k) - Because analysis consisted of total nitrate/nitrite, value for nitrate is used in this baseline RA.
(l) - Has been withdrawn by the RfD/RfC work group
(m) - The RfD/RfC work group has recently classified the inhalation RfC of xylenes as "non-verifiable".
(n) - Under CRAVE work group review
"--" - Not applicable

Acronyms:
RfDo - Oral reference dose
UF - Uncertainty factor
RfDi - Inhalation reference dose
SFo - Oral slope factor
SFi - Inhalation slope factor
ND - No data
ID - Insufficient data available
UR - Under review
NOEL - No observable effect level
NOAEL - No observable adverse effect level (see Appendix B).
MCL - Maximum contaminant level
CNS - Central nervous system
RfC - Reference concentration (see Appendix B)
CRAVE - Carcinogen Risk Assessment Verification Endeavor (see Appendix B)
*- Replaces original Table 5-1 in the final Baseline RA; Dames & Moore, 1992a
**- New contaminant of concern based on followup fieldwork results.

different land use scenarios--residential, light industrial, military, construction, agricultural, and recreational--were identified to evaluate exposures under future conditions.

Principal exposure pathways considered to be complete and selected for quantification at one or more sites under current land use conditions are summarized in Table ES-4.*

Of the possible future land uses for UMDA property (i.e., residential, light industrial, military, construction, agricultural, and recreational), residential land use generally yields the highest exposures because of the long exposure frequency and duration for this population. Therefore, the residential scenario is assumed to be the most conservative future scenario and the most appropriate land use to consider when estimating risks or hazards. Principal exposure pathways considered to be complete and selected for quantification at one or more sites under future residential land use conditions are summarized in Table ES-5.*

Four followup fieldwork sites (Sites 15, 17, 18, and 19) are located in Operable Unit B, the Ammunition Demolition Activity (ADA) area. Future military use of these sites was quantitatively evaluated, because the Oregon National Guard could use this area for tank training exercises. Only the inhalation of contaminated soil as airborne dust (pathway 5) was considered complete for this future land use scenario.

Although the dermal absorption of contaminants from soil (pathway 1) was complete for certain sites under current and future land use conditions, it was not quantitatively evaluated at many sites, because data were not available on dermal absorption of the contaminants of concern in soil.

Although the inhalation of vapors volatilized from soil (pathway 4) was complete for certain sites under both current and future land use conditions, it was not quantitatively evaluated because: (1) very few volatile organic compounds (VOCs) were identified as contaminants of concern in soil at sites where this pathway was complete; (2) the 95 percent upper confidence limit (UCL) concentrations of

TABLE ES-4*

Summary of Baseline Risk Assessment for UMDA - Current Land Use Scenario

Receptor	Exposure Pathway	Contributing Sites	Contaminants of Concern (Soil--to a depth of 2 feet)	Risk Characterization
Worker Near Explosives Washout Area	Inhalation of Dust	4, 5**, 9, 15**, 16, 18**, 19**, 21, 26**, 31, 36**, 38, 39, 47**, 52, 57 II, 57 III, 60, and 67	Metals, cyanide, explosives, nitrite/nitrate, VOAs, semi-VOAs, pesticides, and PCBs.	The potential carcinogenic risk and noncarcinogenic hazard for the dust inhalation pathway are 3E-08 and 4E-03, respectively.
Open Detonation Pit and Open Burning Tray Workers	Inhalation of Dust	15**, 16, 19**, 32 I, 57 I, and 57 II	Metals, cyanide, explosives, and nitrite/nitrate.	The potential carcinogenic risk and noncarcinogenic hazard for the dust inhalation pathway are 4E-07 and 2E-01, respectively.
Target Range Users	Incidental Soil Ingestion Inhalation of Dust	15**, 16, 57 III, and 60	Metals, cyanide, explosives, and nitrite/nitrate.	The multiple pathway potential carcinogenic risk and noncarcinogenic hazard are 7E-10 and 7E-04, respectively.
Worker Near SW Warehouse Area	Incidental Soil Ingestion Inhalation of Dust	1, 15**, 16, 19**, 21, 37, 46, and 57 III	Metals, cyanide, explosives, nitrite/nitrate, VOAs, and semi-VOAs.	The multiple pathway potential carcinogenic risk and noncarcinogenic hazard are 3E-08 and 6E-03, respectively.
DRMO Worker	Incidental Soil Ingestion Inhalation of Dust	15**, 16, 19**, 21, 22**, 27, 31, 38, and 57 III	Metals, cyanide, explosives, nitrite/nitrate, semi-VOAs, and pesticides.	The multiple pathway potential carcinogenic risk and noncarcinogenic hazard are 8E-09 and 7E-03, respectively.
Worker in Pesticide Bldg.	Inhalation of Dust	15**, 16, 19**, 21, 22**, 31, 38, 57 III and 60	Metals, cyanide, explosives, nitrite/nitrate, semi-VOAs, and pesticides.	The potential carcinogenic risk and noncarcinogenic hazard for the dust inhalation pathway are 2E-10 and 4E-05, respectively.
Workers at Bldgs 612 & 617	Inhalation of Dust	9, 15**, 16, 18**, 19**, 38, 41, 45 (Bldg 612), 45 (Bldg (617), 57 I, and 57 II	Metals, cyanide, explosives, VOAs, semi-VOAs, and nitrite/nitrate.	The potential carcinogenic risk and noncarcinogenic hazard for the dust inhalation pathway are 7E-08 and 8E-03, respectively.
Eastern Boundary Residents	Inhalation of Dust	4, 5**, 9, 10, 15**, 16, 18**, 19**, 21, 25 I, 26**, 31, 38, 39, 47**, 52, 57 I, 57 II, 57 III, 60, 67, and 81 I	Metals, cyanide, explosives, nitrite/nitrate, semi-VOAs, pesticides, and PCBs.	The potential carcinogenic risk and noncarcinogenic hazard for the dust inhalation pathway are 3E-08 and 3E-03, respectively.
Hermiston Residents	Inhalation of Dust	9, 10, 15**, 16, 18**, 19**, 21, 22**, 25 I, 25 II, 26**, 31, 38, 39, 41, 52, 53, 57 I, 57 II, 57 III, 60, and 81 I	Metals, cyanide, explosives, nitrite/nitrate, semi-VOAs, and pesticides.	The potential carcinogenic risk and noncarcinogenic hazard for the dust inhalation pathway are 2E-08 and 2E-03, respectively.
Western Boundary Residents	Inhalation of Dust	15**, 16, and 19**	Metals, cyanide, explosives, and nitrite/nitrate.	The potential carcinogenic risk and noncarcinogenic hazard for the dust inhalation pathway are 4E-08 and 2E-02, respectively.
Irrigon Residents	Inhalation of Dust	15**, 16, and 19**	Metals, cyanide, explosives, and nitrite/nitrate.	The potential carcinogenic risk and noncarcinogenic hazard for the dust inhalation pathway are 5E-09 and 2E-03, respectively.

* - Replaces original Table 9-2 in the Final Baseline RA; Dames & Moore, 1992a.
** - Site at which followup fieldwork was conducted.

TABLE ES-5*

Summary of Baseline Risk Assessment for UMDA - Future Land Use Scenario

	Site No.	Site Name	Contaminants of Concern	Exposure Assessment	Risk Characterization
	OPERABLE UNIT A				
	4	Explosive Washout Lagoons	Groundwater: flood gravel aquifer--metals, explosives, nitrite/nitrate, and VOAs; basalt aquifer--metals and explosives. Soil: shallow (to a depth of 2 feet)--explosives and nitrite/nitrate; shallow and subsurface (to a depth of 10 feet)--explosives and nitrite/nitrate.	Pathways 1, 2, 3, 5, 6, 7, and 12 are complete and quantified for the future residential land use scenario.	The multiple pathway potential carcinogenic risk and noncarcinogenic hazard for Site 4 (soil and the flood gravel aquifer) for the future residential land use scenario are 2E-01 and 9E+03, respectively. The multiple pathway potential carcinogenic risk and noncarcinogenic hazard for Site 4 (soil and the basalt aquifer) for the future residential land use scenario are 2E-01 and 9E+03, respectively. Pathway 12 (crop ingestion) presents the greatest potential risk and hazard for both the flood gravel and basalt aquifers.
**	5	Explosive Washout Plant	Soil: shallow (to a depth of 2 feet)--explosives and nitrite/nitrate; shallow and subsurface (to a depth of 10 feet)--explosives and nitrite/nitrate	Pathways 1, 2, 3, and 12 are complete and quantified for the future residential land use scenario.	The multiple pathway potential carcinogenic risk and noncarcinogenic hazard for Site 5 for the future residential land use scenario are 1E-01 and 6E+03, respectively. Pathway 12 (crop ingestion) presents the greatest potential risk and hazard.
**	36	Bldg 493-Paint Sludge Discharge Area	Soil: shallow (to a depth of 2 feet)--metals and nitrite/nitrate.	Pathways 2, 3, and 12 are complete and quantified for the future residential land use scenario.	The multiple pathway potential carcinogenic risk and noncarcinogenic hazard for Site 36 for the future residential land use scenario are 4E-07 and 2E+01, respectively. Pathways 2 (soil ingestion) and 12 (crop ingestion) present the greatest potential hazard.
**	47	Boiler/Laundry Effluent Discharge Site	Groundwater: flood gravel aquifer--metals, explosives, nitrite/nitrate, and VOAs; basalt aquifer--metals and explosives. Soil: shallow (to a depth of 2 feet)--metals, nitrite/nitrate, semi-VOAs, and pesticides/PCBs; shallow and subsurface (to a depth of 10 feet)--metals, nitrite/nitrate, semi-VOAs, and pesticide/PCBs.	Pathways 1, 2, 3, 5, 6, 7 and 12 are complete and quantified for the future residential land use scenario.	The multiple pathway potential carcinogenic risk and noncarcinogenic hazard for Site 47 (soil and flood gravel aquifer) for the future residential land use scenario are 2E-03 and 7E+01, respectively. The multiple pathway potential carcinogenic risk and noncarcinogenic hazard for Site 47 (soil and basalt aquifer) for the future residential land use scenario are 4E-03 and 4E+01, respectively. Pathway 5 (groundwater ingestion) presents the greatest potential risk for both the flood gravel and basalt aquifers. Pathways 5 (groundwater ingestion) and 12 (crop ingestion) present the greatest potential hazard for both the flood gravel and basalt aquifers.
	52	Coyote Coulee Discharge Gullies	Soil: shallow (to a depth of 2 feet)--metals and explosives	Pathways 1, 2, 3, and 12 are complete and quantified for the future residential land use scenario.	The multiple pathway potential carcinogenic risk and noncarcinogenic hazard for Site 52 for the future residential land use scenario are 5E-04 and 4, respectively. Pathway 12 (crop ingestion) presents the greatest potential risk and hazard.

TABLE ES-5* (cont'd)

Summary of Baseline Risk Assessment for UMDA - Future Land Use Scenario

Site No.	Site Name	Contaminants of Concern	Exposure Assessment	Risk Characterization
67	Bldg 493-Brass Cleaning Operations Area	Groundwater: flood gravel aquifer--metals, explosives, nitrite/nitrate, and VOAs; basalt aquifer--metals and explosives. Soil: shallow (to a depth of 2 feet)--metals; shallow and subsurface (to a depth of 10 feet)--metals.	Pathways 2, 3, 5, 6, 7, and 12 are complete and quantified for the future residential land use scenario.	The multiple pathway potential carcinogenic risk and noncarcinogenic hazard for Site 67 (soil and the flood gravel aquifer) for the future residential land use scenario are 2E-03 and 7E+01, respectively. The multiple pathway potential carcinogenic risk and noncarcinogenic hazard for Site 67 (soil and the basalt aquifer) for the future residential land use scenario are 3E-03 and 4E+01, respectively. Pathway 5 (groundwater ingestion) presents the greatest potential risks for both the flood gravel and basalt aquifers. Pathways 5 (groundwater ingestion) and 12 (crop ingestion) present the greatest potential hazards for both the flood gravel and basalt aquifers.
OPERABLE UNIT 8				
7	Aniline Pit	Soil: subsurface (to a depth of 10 feet)--none detected.	No complete pathways, because no contaminants of concern are detected.	No risks or hazards are calculated, because no complete exposure pathways are identified.
8	Acid Pit	Groundwater: metals, explosives, nitrite/nitrate, and VOAs. Soil: subsurface (to a depth of 10 feet)--metals.	Pathways 5, 6, 7, and 12 are complete and quantified for the future residential land use scenario.	The multiple pathway potential carcinogenic risk and noncarcinogenic hazard for Site 8 for the future residential land use scenario are 6E-04 and 3, respectively. Pathway 5 (groundwater ingestion) presents the greatest potential risk and hazard.
13	Smoke Canister Disposal Area	Groundwater: metals. Soil: shallow (to a depth of 2 feet)--metals and explosives; shallow and subsurface (to a depth of 10 feet)--metals and explosives.	Pathways 1, 2, 3, 5, and 12 are complete and quantified for the future residential land use scenario.	The multiple pathway potential carcinogenic risk and noncarcinogenic hazard for Site 13 for the future residential land use scenario are 2E-03 and 7, respectively. Pathways 5 (groundwater ingestion) and 12 (crop ingestion) present the greatest potential risk and hazard.
			Pathway 3 is complete and quantified for the future military land use scenario.	The potential carcinogenic risk and noncarcinogenic hazard for Site 13 for the future military land use scenario (Pathway 3, dust inhalation) are 2E-07 and 9E-02, respectively.
14	Flare and Fuse Disposal Area/Bird Cage Burn Area	Groundwater: metals. Soil: shallow (to a depth of 2 feet)--metals; shallow and subsurface (to a depth of 10 feet)--metals and nitrite/nitrate.	Pathways 2, 3, 5, and 12 are complete and quantified for the future residential land use scenario.	The multiple pathway potential carcinogenic risk and noncarcinogenic hazard for Site 14 for the future residential land use scenario are 7E-04 and 4, respectively. Pathway 5 (groundwater ingestion) presents the greatest potential risk and hazard.
			Pathway 3 is complete and quantified for the future military land use scenario.	The potential carcinogenic risk and noncarcinogenic hazard for Site 14 for the future military land use scenario (Pathway 3, dust inhalation) are 2E-06 and 2, respectively, and are due to the presence of chromium.

TABLE ES-5* (cont'd)

Summary of Baseline Risk Assessment for UMDA - Future Land Use Scenario

Site No.	Site Name	Contaminants of Concern	Exposure Assessment	Risk Characterization
** 15	TNT Sludge Burial and Burn Area	Groundwater: metals. Soil: shallow (to a depth of 2 feet)--metals, explosives, and nitrite/nitrate; shallow and subsurface (to a depth of 10 feet)--metals, explosives, nitrite/nitrate, VOAs, and semi-VOAs.	Pathways 1, 2, 3, 5, and 12 are complete and quantified for the future residential land use scenario.	The multiple pathway potential carcinogenic risk and noncarcinogenic hazard for Site 15 for the future residential land use scenario are 3E-02 and 1E+03, respectively. Pathway 12 (crop ingestion) presents the greatest potential risk and hazard.
			Pathway 3 is complete and quantified for the future military land use scenario.	The potential carcinogenic risk and noncarcinogenic hazard for Site 15 for the future military land use scenario (Pathway 3, dust inhalation) are 3E-04 and 2E+02, respectively, and are mainly due to the presence of chromium.
16	Open Detonation Pits	Groundwater: metals. Soil: shallow (to a depth of 2 feet)--metals, cyanide, explosives, and nitrite/nitrate; shallow and subsurface (to a depth of 10 feet)--metals, cyanide, explosives, nitrite/nitrate.	Pathways 1, 2, 3, 5, and 12 are complete and quantified for the future residential land use scenario.	The multiple pathway potential carcinogenic risk and noncarcinogenic hazard for Site 16 for the future residential land use scenario are 2E-03 and 2E+01, respectively. Pathways 5 (groundwater ingestion) and 12 (crop ingestion) present the greatest potential risks. Pathways 2 (soil ingestion), 5 (groundwater ingestion), and 12 (crop ingestion) present the greatest potential hazards.
			Pathway 3 is complete and quantified for the future military land use scenario.	The potential carcinogenic risk and noncarcinogenic hazard for Site 16 for the future military land use scenario (Pathway 3, dust inhalation) are 4E-08 and 1E-01, respectively.
** 17	Aboveground OD Area	Soil: shallow (to a depth of 2 feet)--metals and explosives.	Pathways 1, 2, 3, and 12 are complete and quantified for the future residential land use scenario.	The multiple pathway potential carcinogenic risk and noncarcinogenic hazard for Site 17 for the future residential land use scenario are 4E-03 and 5E+01, respectively. Pathway 12 (crop ingestion) presents the greatest potential risk. Pathways 2 (soil ingestion) and 12 (crop ingestion) present the greatest potential hazard.
			Pathway 3 is complete and quantified for the future military land use scenario.	The potential carcinogenic risk and noncarcinogenic hazard for Site 17 for the future military land use scenario (Pathway 3, dust inhalation) are 3E-08 and 5E-04, respectively.
** 18	Dunnage Pits	Groundwater: metals. Soil: shallow (to a depth of 2 feet)--metals, VOAs, semi-VOAs, and pesticides; shallow and subsurface (to a depth of 10 feet)--metals, VOAs, semi-VOAs, pesticides, and PCBs.	Pathways 2, 3, 5, and 12 are complete and quantified for the future residential land use scenario.	The multiple pathway potential carcinogenic risk and noncarcinogenic hazard for Site 18 for the future residential land use scenario are 8E-04 and 5, respectively. Pathway 5 (groundwater ingestion) presents the greatest potential risk. Pathways 5 (groundwater ingestion) and 12 (crop ingestion) present the greatest potential hazards.

TABLE ES-5* (cont'd)

Summary of Baseline Risk Assessment for UMDA - Future Land Use Scenario

Site No.	Site Name	Contaminants of Concern	Exposure Assessment	Risk Characterization
** 18, cont'd	Dunnage Pits		Pathway 3 is complete and quantified for the future military land use scenario.	The potential carcinogenic risk and noncarcinogenic hazard for Site 18 for the future military land use scenario (Pathway 3, dust inhalation) are 3E-06 and 3, respectively, which are mainly due to the presence of chromium.
** 19	Open Burning Trenches/Pads	Groundwater: metals and explosives. Soil: shallow (to a depth of 2 feet)--metals, explosives, and nitrite/nitrate; shallow and subsurface (to a depth of 10 feet)--metals, explosives, nitrite/nitrate, and VOAs.	Pathways 1, 2, 3, 5, 7, and 12 are complete and quantified for the future residential land use scenario.	The multiple pathway potential carcinogenic risk and noncarcinogenic hazard for Site 19 for the future residential land use scenario are 3E-01 and 7E+04, respectively. Pathway 12 (crop ingestion) presents the greatest potential risk and hazard.
			Pathway 3 is complete and quantified for the future military land use scenario.	The potential carcinogenic risk and noncarcinogenic hazard for Site 19 for the future military land use scenario (Pathway 3, dust inhalation) are 1E-05 and 8, respectively. The potential carcinogenic risk of 1E-05 is mainly due to the presence of arsenic, cadmium, and chromium. The noncarcinogenic hazard of 8 is mainly due to the presence of barium and chromium.
21	Missile Fuel Storage Areas	Soil: shallow (to a depth of 2 feet)--nitrite/nitrate; shallow and subsurface (to a depth of 10 feet)--metals, nitrite/nitrate.	Pathways 2, 3, and 12 are complete and quantified for the future residential land use scenario.	A multiple pathway potential carcinogenic risk was not calculated because a slope factor is not available for nitrite/nitrate, the only contaminant of concern in Site 21 soil. The multiple pathway noncarcinogenic hazard is 3E-05.
			Pathway 3 is complete and quantified for the future military land use scenario.	The potential carcinogenic risk and noncarcinogenic hazard for Site 21 for the future military land use scenario (Pathway 3, dust inhalation) are not calculated because inhalation toxicity criteria are not available for nitrite/nitrate.
31	Pesticide Pits	Groundwater: metals, explosives, nitrite/nitrate, and VOAs. Soil: shallow (to a depth of 2 feet)--metals, explosives, nitrite/nitrate, semi-VOAs, and pesticides; shallow and subsurface (to a depth of 10 feet)--metals, explosives, nitrite/nitrate, VOAs, semi-VOAs, and pesticides.	Residential Land Use Scenario: Pathways 1, 2, 3, 5, 6, 7, 11, and 12 are complete and quantified for the future residential land use scenario.	The multiple pathway potential carcinogenic risk and noncarcinogenic hazard for Site 31 for the future residential land use scenario are 8E-02 and 2E+04, respectively. Pathway 12 (crop ingestion) presents the greatest potential risk and hazard.
			Future Light Industrial Land Use Scenario: Pathways 1, 2, 3, 5, and 8 are complete and quantified for the future light industrial land use scenario.	The multiple pathway potential carcinogenic risk and noncarcinogenic hazard for Site 31 for the future light industrial land use scenario are 7E-04 and 1E+02, respectively. Pathways 1 (dermal absorption of soil contaminants) and 5 (groundwater ingestion) present the greatest potential risk. Pathway 1 (dermal absorption of soil contaminants) presents the greatest potential hazard.

TABLE ES-5* (cont'd)

Summary of Baseline Risk Assessment for UMDA - Future Land Use Scenario

Site No.	Site Name	Contaminants of Concern	Exposure Assessment	Risk Characterization
31, cont'd	Pesticide Pits		Future Military Land Use Scenario: Pathways 1, 2, 3, 5, and 8 are complete and quantified for the future military land use scenario. Only pathway 3 applies to the future tank training exercises at Site 31, but all five pathways may apply to other future military uses at Site 31.	The multiple pathway potential carcinogenic risk and noncarcinogenic hazard for Site 31 for the future military land use scenario are 8E-05 and 9E+01, respectively. Pathways 1 (dermal absorption of soil contaminants) and 5 (groundwater ingestion) present the greatest potential risks. Pathway 1 (dermal absorption of soil contaminants) presents the greatest potential hazard.
			Future Construction Land Use Scenario: Pathways 1, 2, and 3 are complete and quantified for the future construction worker land use scenario.	The multiple pathway potential carcinogenic risk and noncarcinogenic hazard for Site 31 for the future construction land use scenario are 7E-06 and 9, respectively. Pathways 1 (dermal absorption of soil contaminants) and 2 (soil ingestion) present the greatest potential risks. Pathways 1 (dermal absorption of soil contaminants), 2 (soil ingestion), and 3 (dust inhalation) present the greatest potential hazards.
			Future Agricultural Land Use Scenario: Pathways 1, 2, 3, and 8 are complete and quantified for the future agricultural land use scenario.	The multiple pathway potential carcinogenic risk and noncarcinogenic hazard for Site 31 for the future agricultural land use scenario are 1E-04 and 1E+01, respectively. Pathway 1 (dermal absorption of soil contaminants) presents the greatest potential risk and hazard.
			Future Recreational Land Use Scenario: Pathway 10 is complete and quantified for the future recreational land use scenario.	The potential carcinogenic risk and noncarcinogenic hazard for Site 31 for the future recreational land use scenario are 7E-07 and 1E-01, respectively.
32	Open Burning Trays Location I	Soil: shallow (to a depth of 2 feet)--metals, explosives, and nitrite/nitrate.	Pathways 1, 2, 3, and 12 are complete and quantified for the future residential land use scenario.	The multiple pathway potential carcinogenic risk and noncarcinogenic hazard for Site 32 Location I for the future residential land use scenario are 1E-03 and 2, respectively. Pathway 12 (crop ingestion) presents the greatest potential risk and hazard.
			Pathway 3 is complete and quantified for the future military land use scenario.	The potential carcinogenic risk and noncarcinogenic hazard for the future military land use scenario (Pathway 3, dust inhalation) are not calculated because the inhalation slope factors and inhalation reference doses are not available for any of the contaminants of concern.

TABLE ES-5* (cont'd)

Summary of Baseline Risk Assessment for UMDA - Future Land Use Scenario

Site No.	Site Name	Contaminants of Concern	Exposure Assessment	Risk Characterization
32	Open Burning Trays Location II	Soil: shallow (to a depth of 2 feet)--metals, sidential	Pathways 1, 2, 3, and 12 are complete land use scenario.	The multiple pathway potential carcinogenic risk and noncarcinogenic hazard for Site 32 Location II for the future residential land use scenario are 1E-03 and 4, respectively. Pathway 12 (crop ingestion) presents the greatest potential risk. Pathways 2 (soil ingestion) and 12 (crop ingestion) present the greatest potential hazards.
			Pathway 3 is complete and quantified for the future military land use scenario.	The potential carcinogenic risk for Site 32 Location II for the future military land use scenario (Pathway 3, dust inhalation) is not calculated because the inhalation slope factors are not available for any of the contaminants of concern. The potential noncarcinogenic hazard is 1, due to the presence of barium.
38	Pit Field Area	Groundwater: metals. Soil: shallow (to a depth of 2 feet)--metals and explosives; shallow and subsurface (to a depth of 10 feet)--metals, cyanide, and explosives.	Pathways 1, 2, 3, 5, and 12 are complete and quantified for the future residential land use scenario.	The multiple pathway potential carcinogenic risk and noncarcinogenic hazard for Site 38 for the future residential land use scenario are 7E-04 and 8, respectively. Pathway 5 (groundwater ingestion) presents the greatest potential risk. Pathways 5 (groundwater ingestion) and 12 (crop ingestion) present the greatest potential hazards.
			Pathway 3 is complete and quantified for the future military land use scenario.	The potential carcinogenic risk and noncarcinogenic hazard for Site 38 for the future military land use scenario (Pathway 3, (dust inhalation) are 3E-07 and 4E-04, respectively.
41	GB/VX Decontamination Solution Burial Areas	Groundwater: metals. Soil: shallow (to a depth of 2 feet)--metals and semi-VOAs; shallow and subsurface (to a depth of 10 feet)--metals, VOAs, and semi-VOAs.	Pathways 2, 3, 5, and 12 are complete and quantified for the future residential land use scenario.	The multiple pathway potential carcinogenic risk and noncarcinogenic hazard for Site 41 for the future residential land use scenario are 6E-04 and 3, respectively. Pathway 5 (groundwater ingestion) presents the greatest potential risk and hazard.
			Pathway 3 is complete and quantified for the future military land use scenario.	Potential carcinogenic risks and noncarcinogenic hazards are not calculated for pathway 3 because inhalation toxicity criteria are not available for any of the contaminants of concern.
55	Trench/Burn Field	Groundwater: metals. Soil: subsurface (to a depth of 10 feet)--metals and explosives.	Pathways 5 and 12 are complete and quantified for the future residential land use scenario.	The multiple pathway potential carcinogenic risk and noncarcinogenic hazard for Site 55 for the future residential land use scenario are 3E-04 and 2, respectively. Pathway 5 (groundwater ingestion) presents the greatest potential risk and hazard.

TABLE ES-5* (cont'd)

Summary of Baseline Risk Assessment for UMDA - Future Land Use Scenario

Site No.	Site Name	Contaminants of Concern	Exposure Assessment	Risk Characterization
56	Munitions Crate Burn Area	Soil: shallow (to a depth of 2 feet)--metals. shallow and subsurface (to a depth of 10 feet)--metals.	Pathways 2, 3, and 12 are complete and quantified for the future residential land use scenario.	The multiple pathway potential carcinogenic risk and noncarcinogenic hazard for Site 56 for the future residential land use scenario are 3E-05 and 3E-03, respectively. Pathways 2 (soil ingestion) and 12 (crop ingestion) present the greatest potential risk.
			Pathway 3 is complete and quantified for the future military land use scenario.	The potential carcinogenic risk for Site 56 for the future military land use scenario (Pathway 3, dust inhalation) is 7E-09. A potential noncarcinogenic hazard is not calculated for pathway 3 because inhalation reference doses are not available for any of the contaminants of concern.
57	Former Pit Area Location I	Groundwater: metals. Soil: shallow (to a depth of 2 feet)--metals; shallow and subsurface (to a depth of 10 feet)--metals and VOAS.	Pathways 2, 3, 5, and 12 are complete and quantified for future residential land use scenario.	The multiple pathway potential carcinogenic risk and noncarcinogenic hazard for Site 57 Location I for the future residential land use scenario are 6E-04 and 3, respectively. Pathway 5 (groundwater ingestion) presents the greatest potential risk and hazard.
			Pathway 3 is complete and quantified for the future military land use scenario.	The potential carcinogenic risk for Site 57 Location I for the future military land use scenario (pathway 3, dust inhalation) is not calculated because the inhalation slope factors are not available for any of the contaminants of concern. The potential noncarcinogenic hazard is 5E-05.
57	Former Pit Area Location II	Groundwater: metals. Soil: shallow (to a depth of 2 feet)--metals and explosives; shallow and subsurface (to a depth of 10 feet)--metals, explosives, and nitrite/nitrate.	Pathways 1, 2, 3, 5, and 12 are complete and quantified for the future residential land use scenario.	The multiple pathway potential carcinogenic risk and noncarcinogenic hazard for Site 57 Location II for the future residential land use scenario are 6E-04 and 6, respectively. Pathway 5 (groundwater ingestion) presents the greatest potential risk. Pathways 5 (groundwater ingestion) and 12 (crop ingestion) present the greatest potential hazards.
			Pathway 3 is complete and quantified for the future military land use scenario.	The potential carcinogenic risk and noncarcinogenic hazard for Site 57 Location II for the future military land use scenario (pathway 3, dust inhalation) are 4E-08 and 1E-03, respectively.
57	Former Pit Area Location III	Groundwater: metals. Soil: shallow (to a depth of 2 feet)--metals; shallow and subsurface (to a depth of 10 feet)--metals and explosives.	Pathways 2, 3, 5, and 12 are complete and quantified for the future residential land use scenario.	The multiple pathway potential carcinogenic risk and noncarcinogenic hazard for Site 57 Location III for the future residential land use scenario are 6E-04 and 4, respectively. Pathway 5 (groundwater ingestion) presents the greatest potential risk and hazard.

TABLE ES-5* (cont'd)

Summary of Baseline Risk Assessment for UMDA - Future Land Use Scenario

Site No.	Site Name	Contaminants of Concern	Exposure Assessment	Risk Characterization
57, cont'd	Former Pit Area Location III		Pathway 3 is complete and quantified for the future military land use scenario.	The potential carcinogenic risk and noncarcinogenic hazard for Site 57 Location III for the future military land use scenario (pathway 3, dust inhalation) are 2E-07 and 4E-05, respectively.
58	Borrow/Burn/Disposal Area	Soil: shallow (to a depth of 2 feet)--none detected; shallow and subsurface (to a depth of 10 feet)--none detected.	No complete pathways, because no contaminants of concern are detected.	No risks or hazards are calculated, because no complete exposure pathways are identified.
59	GB/VX Decontamination Solution Disposal Area	Groundwater: None detected. Soil: shallow (to a depth of 2 feet)--none detected; shallow and subsurface (to a depth of 10 feet)--none detected.	No complete pathways, because no contaminants of concern are detected.	No risks or hazards are calculated, because no complete exposure pathways are identified.
60	Active Firing Range	Soil: shallow (to a depth of 2 feet)--metals.	Pathways 2, 3, and 12 are complete and quantified for the future residential land use scenario.	A potential carcinogenic risk is not calculated for Site 60 because slope factors are not available for any of the contaminants of concern. The total potential noncarcinogenic hazard is 3E-01.
			Pathway 3 is complete and quantified for the future military land use scenario.	Potential carcinogenic risk and hazard are not calculated for the future military land use scenario (pathway 3, dust inhalation) because inhalation toxicity criteria are not available for any of the contaminants of concern.
OPERABLE UNIT C				
** 12	Inactive Landfill	Groundwater: metals, cyanide, and explosives. Soil: shallow (to a depth of 2 feet)--metals, semi-VOAs, and pesticides; shallow and subsurface (to a depth of 10 feet)--metals, nitrite/nitrate, semi-VOAs, pesticides, and PCBs.	Pathways 2, 3, 5, 7, and 12 are complete and quantified for the future residential land use scenario.	The multiple pathway potential carcinogenic risk and noncarcinogenic hazard for Site 12 for the future residential land use scenario are 1E-04 and 1, respectively. Pathway 5 (groundwater ingestion) presents the greatest potential risk.
** 50	Railroad Landfill Area	Groundwater: metals, cyanide, and explosives.	Pathways 5, 7, and 12 are complete and quantified for the future residential land use scenario.	The multiple pathway potential carcinogenic risk and noncarcinogenic hazard for Site 50 for the future residential land use scenario are 1E-04 and 8E-01, respectively. Pathway 5 (groundwater ingestion) presents the greatest potential risk.
82	Former Gravel Pit/ Disposal Location	Soil: Subsurface (to a depth of 10 feet)--none detected.	No complete pathways, because no contaminants of concern are detected.	No risks or hazards are calculated, because no complete exposure pathways are identified.
OPERABLE UNIT D				
9	Remote Munitions Disassembly/GB Bomb Disassembly Area	Soil: shallow (to a depth of 2 feet)--metals and explosives.	Pathways 1, 2, 3, and 12 are complete and quantified for the future residential land use scenario.	The multiple pathway potential carcinogenic risk and noncarcinogenic hazard for Site 9 for the future residential land use scenario are 4E-04 and 4, respectively. Pathway 12 (crop ingestion) presents the greatest potential risk and hazard.

TABLE ES-5* (cont'd)

Summary of Baseline Risk Assessment for UMDA - Future Land Use Scenario

Site No.	Site Name	Contaminants of Concern	Exposure Assessment	Risk Characterization
OPERABLE UNIT E				
1	Deactivation Furnace	Soil: shallow (to a depth of 2 feet)--metals; shallow and subsurface (to a depth of 10 feet)--metals.	Pathways 2, 3, and 12 are complete and quantified for the future residential land use scenario.	The multiple pathway potential carcinogenic risk and noncarcinogenic hazard for Site 1 for the future residential land use scenario are 2E-05 and 3, respectively. Pathways 2 (soil ingestion) and 12 (crop ingestion) present the greatest potential risk. Pathway 2 (soil ingestion) presents the greatest hazard.
3	Hazardous Waste Storage Facility	Groundwater: Not analyzed. Soil: Not analyzed.	No complete pathways because no media were analyzed.	No risks or hazards calculated because no complete exposure pathways are identified.
25	Metal Ore Piles Location I	Soil: shallow (to a depth of 2 feet)--metals.	Pathways 2, 3, and 12 are complete and quantified for the future residential land use scenario.	A potential carcinogenic risk is not calculated for Site 25 Location I because slope factors are not available for any of the contaminants of concern. The total potential noncarcinogenic hazard is 2. Pathway 2 (soil ingestion) presents the greatest potential hazard.
** 26	**Metal Ingot Stockpiles**	**Soil: shallow (to a depth of 2 feet)--metals.**	**Pathways 2, 3, and 12 are complete and quantified for the future residential land use scenario.**	**A potential carcinogenic risk is not calculated for Site 26 because slope factors are not available for any of the contaminants of concern. The total potential noncarcinogenic hazard is 4E-03.**
34	Paint Spray and Shot Blast Area	Soil: shallow (to a depth of 2 feet)--metals and semi-VOAs.	Pathways 2, 3, and 12 are complete and quantified for the future residential land use scenario.	The multiple pathway potential carcinogenic risk and noncarcinogenic hazard for Site 34 for the future residential land use scenario are 2E-07 and 6E-02, respectively.
35	Malathion Storage Leak Area	Soil: shallow (to a depth of 2 feet)--pesticides; shallow and subsurface (to a depth of 10 feet)--pesticides.	Pathways 2, 3, and 12 are complete and quantified for the future residential land use scenario.	The multiple pathway potential carcinogenic risk and noncarcinogenic hazard for Site 35 for the future residential land use scenario are 3E-07 and 2E-03, respectively.
37	Bldg 131-Paint Sludge Discharge Area	Soil: shallow (to a depth of 2 feet)--metals, VOAs, semi-VOAs.	Pathways 2, 3, and 12 are complete and quantified for the future residential land use scenario.	The multiple pathway potential carcinogenic risk and noncarcinogenic hazard for Site 37 for the future residential land use scenario are 1E-04 and 1, respectively. Pathway 12 (crop ingestion) presents the greatest potential risk and hazard.
44	Road Oil Application/ Disposal Sites-- Location I	Soil: shallow (to a depth of 2 feet)--none detected.	No complete pathways, because no contaminants of concern are detected.	No risks or hazards calculated, because no complete exposure pathways are identified.
46	Railcar Unloading Area	Soil: shallow (to a depth of 2 feet)--metals and semi-VOAs.	Pathways 2, 3, and 12 are complete and quantified for the future residential land use scenario.	The multiple pathway potential carcinogenic risk and noncarcinogenic hazard for Site 46 for the future residential land use scenario are 3E-07 and 1E-01, respectively.

TABLE ES-5* (cont'd)

Summary of Baseline Risk Assessment for UMDA - Future Land Use Scenario

Site No.	Site Name	Contaminants of Concern	Exposure Assessment	Risk Characterization
80	Disposal Pit and Graded Area	Soil: subsurface (to a depth of 10 feet)--none detected.	No complete pathways, since no contaminants of concern are detected.	No risks or hazards calculated, since no complete exposure pathways are identified.
81	Former Raw Materials Storage Location I	Soil: shallow (to a depth of 2 feet)--metals.	Pathways 2, 3, and 12 are complete and quantified for the future residential land use scenario.	A total potential carcinogenic risk was not calculated because slope factors are not available for any of the contaminants of concern in Site 81 soil. The multiple pathway potential noncarcinogenic hazard is 3E-05.
OPERABLE UNIT F				
6	Sewage Treatment Plant	Soil: subsurface (to a depth of 10 feet)--none detected.	No complete pathways, since no contaminants of concern are detected.	No risks or hazards calculated, since no complete exposure pathways are identified.
** 30	Stormwater Discharge Area	Soil: shallow (to a depth of 2 feet)--metals and pesticides; shallow and subsurface (to a depth of 10 feet)--metals and pesticides.	Pathways 2, 3, and 12 are complete and quantified for the future residential land use scenario.	The multiple pathway potential carcinogenic risk and noncarcinogenic hazard for Site 30 for the future residential land use scenario are 1E-06 and 1E-02, respectively. Pathway 12 (crop ingestion) presents the greatest potential risk.
** 48	Pipe Discharge Area	Soil: shallow (to a depth of 2 feet)--metals, nitrite/nitrate, and pesticides; shallow and subsurface (to a depth of 10 feet)--metals, nitrite/nitrate, and pesticides.	Pathways 2, 3, and 12 are complete and quantified for the future residential land use scenario.	The multiple pathway potential carcinogenic risk and noncarcinogenic hazard for Site 48 for the future residential land use scenario are 2E-05 and 6E-01, respectively. Pathway 12 (crop ingestion) presents the greatest potential risk.
OPERABLE UNIT G				
** 11	Active Landfill	Groundwater: metals, cyanide, and explosives.	Pathways 5, 7, and 12 are complete and quantified for the future residential land use scenario.	The multiple pathway potential carcinogenic risk and noncarcinogenic hazard for Site 11 for the future residential land use scenario are 2E-04 and 2, respectively. Pathway 5 (groundwater ingestion) presents the greatest potential risk and hazard.
OPERABLE UNIT H				
** 22	DRMO Area	Soil: shallow (to a depth of 2 feet)--metals and pesticides; shallow and subsurface (to a depth of 10 feet)--metals and pesticides.	Pathways 2, 3, and 12 are complete and quantified for the future residential land use scenario.	The multiple pathway potential carcinogenic risk and noncarcinogenic hazard for Site 22 for the future residential land use scenario are 5E-07 and 1, respectively. Pathways 2(soil ingestion) and 12 (crop ingestion) present the greatest potential hazard.
27	Pesticide Storage Building	Soil: shallow (to a depth of 2 feet)--metals, semi-VOAs, and pesticides.	Pathways 2, 3, and 12 are complete and quantified for the future residential land use scenario.	The multiple pathway potential carcinogenic risk and noncarcinogenic hazard for Site 27 for the future residential land use scenario are 3E-08 and 5E-03, respectively.

TABLE ES-5* (cont'd)

Summary of Baseline Risk Assessment for UMDA - Future Land Use Scenario

	Site No.	Site Name	Contaminants of Concern	Exposure Assessment	Risk Characterization
**	44	Road Oil Application/ Disposal Sites-- Location II	Soil: shallow (to a depth of 2 feet)--metals; shallow and subsurface (to a depth of 10 feet)--metals.	Pathways 2, 3, and 12 are complete and quantified for the future residential land use scenario.	A total potential carcinogenic risk is not calculated because slope factors are not available for any of the contaminants of concern in Site 44 soil. The multiple pathway potential noncarcinogenic hazard is 5E-04.
	OPERABLE UNIT I				
	10	Former Agent H Storage Area	Soil: shallow (to a depth of 2 feet)--metals; subsurface (to a depth of 10 feet)--metals.	Pathways 2, 3, and 12 are complete and quantified for the future residential land use scenario.	A multiple pathway potential carcinogenic risk is not calculated because a slope factors for antimony, the only contaminant of concern, is not available. The multiple pathway potential noncarcinogenic hazard is 6E-02.
	33	Gravel Pit Disposal Area	Soil: shallow (to a depth of 2 feet)--none detected; shallow and subsurface (to a depth of 10 feet)--none detected.	No complete pathways, because no contaminants of concern are detected.	No risks or hazards calculated because no complete exposure pathways are identified.
	49	Drill and Transfer Site	Soil: shallow (to a depth of 2 feet)--none detected.	No complete pathways because no contaminants of concern are detected.	No risks or hazards calculated because no complete exposure pathways are identified.
	OPERABLE UNIT J				
**	2	Storage Igloos (H1641 & H1642)	Soil: shallow (to a depth of 2 feet)--metals.	Pathways 2, 3, and 12 are complete and quantified for the future residential land use scenario.	The multiple pathway potential carcinogenic risk and noncarcinogenic hazard for Site 2 for the future residential land use scenario are 9E-07 and 3E-01, respectively.
	25	Metal Ore Piles Location II	Soil: shallow (to a depth of 2 feet)--metals.	Pathways 2, 3, and 12 are complete and quantified for the future residential land use scenario.	The multiple pathway potential carcinogenic risk and noncarcinogenic hazard for Site 25 Location II for the future residential land use scenario are 4E-09 and 1, respectively. Pathway 2 (soil ingestion) presents the greatest potential hazard.
	29	Septic Tanks 420, 417, 419, 486, 655-1, 655-2, 622	Soil: subsurface (to a depth of 10 feet)--metals, VOAs, semi-VOAs.	No complete pathways for the future residential land use scenario, because surface soil was not sampled.	No risks or hazards calculated because no complete exposure pathways are identified for the future residential land use scenario.
	39	QA Function Range	Soil: shallow (to a depth of 2 feet)--metals.	Pathways 2, 3, and 12 are complete and quantified for the future residential land use scenario.	A total potential carcinogenic risk is not calculated because slope factors are not available for any of the contaminants of concern in Site 39 soil. The multiple pathway potential noncarcinogenic hazard is 6E-02.
	45	Bldg 612-Boiler Discharge Area Location I	Soil: shallow (to a depth of 2 feet)--metals.	Pathways 2, 3, and 12 are complete and quantified for the future residential land use scenario.	The multiple pathway potential carcinogenic risk and noncarcinogenic hazard for Site 45 Location I for the future residential land use scenario are 1E-08 and 1E-01, respectively.

TABLE ES-5* (cont'd)

Summary of Baseline Risk Assessment for UMDA - Future Land Use Scenario

Site No.	Site Name	Contaminants of Concern	Exposure Assessment	Risk Characterization
45	Bldg 617-Boiler Discharge Area Location II	Soil: shallow (to a depth of 2 feet)--metals.	Pathways 2, 3, and 12 are complete and quantified for the future residential land use scenario.	The multiple pathway potential carcinogenic risk and noncarcinogenic hazard for Site 45 Location II for the future residential land use scenario are 2E-08 and 7E-02, respectively.
53	Bldg-433 Collection Sump/Cistern and Disposal Area	Soil: shallow (to a depth of 2 feet)--metals, and semi-VOAs.	Pathways 2, 3, and 12 are complete and quantified for the future residential land use scenario.	The multiple pathway potential carcinogenic risk and noncarcinogenic hazard for Site 53 for the future residential land use scenario are 7E-09 and 9E-02, respectively.
81	Former Raw Materials Storage Location II	Soil: surface (to a depth of 2 feet)--none detected.	No complete pathways because no contaminants of concern are detected.	No risks or hazards are calculated because no complete exposure pathways are identified.

*-Replaces original Table ES-5 in the Final Baseline RA; Dames & Moore, 1992a.
**-Site at which followup fieldwork was conducted.

these contaminants were generally low compared to their respective detection limits; (3) the risks and hazards associated with pathway 4 were expected to be less than those for the other soil exposure pathways quantified for applicable exposed populations (e.g., current workers, future residents, and future construction workers); and (4) dilution with the large volume of ambient air may significantly decrease the exposure point concentration of these contaminants once emitted from soil.

Pathway 9 (inhalation of vapors during nonshowering use of groundwater) was not selected for quantitative evaluation at sites where it was complete for future residential and nonresidential populations, because: (1) only a few VOCs were identified as contaminants of concern in groundwater; (2) the 95 percent UCL concentrations of these contaminants were generally low compared to their respective detection limits; and (3) dilution into the large volume of air encountered outdoors or in large indoor facilities was expected to significantly lower the exposure point concentrations of VOCs once emitted from groundwater. Therefore, the magnitude of exposure was expected to be small and the associated risks low.

Quantitative estimates of human exposure point concentrations and contaminant intakes were calculated for current and future land use scenarios according to the methodologies presented in Section 6.4 of the Baseline RA. The quality of exposure parameter assumptions and values used in calculating these concentrations and intakes is discussed in Section 7.4 of the Baseline RA. For soil- and groundwater-related exposure scenarios, 95 percent UCL concentrations based on concentrations measured during the RI were used as exposure point concentrations unless the 95 percent UCL concentrations exceeded the maximum concentration detected at a site. In these cases, the maximum detected values were used as exposure point concentrations. No air samples were collected during the RI. Therefore, for the inhalation of contaminated soil as airborne dust (pathway 3), air concentrations were determined using the models described in Appendix B of the Baseline RA. For the consumption of crops irrigated by contaminated groundwater or grown in contaminated soil (pathway 12), the concentrations of contaminants of

concern were determined based on models described in Section 6.4.10 of the Baseline RA.

ES.7* HUMAN HEALTH RISK EVALUATION

The purpose of risk characterization and the methodologies used to estimate potential health hazards/risks are discussed in Section ES.7 of the Baseline RA and are not repeated in this addendum.

Fifteen UMDA sites, at which lead concentrations in soil exceeded 200 parts per million (ppm), were selected for evaluation using the uptake biokinetic (UBK) model (Evans, 1992) described in Section ES.7 of the Baseline RA. These are Sites 1, 13, 14, 32 Location II, 37, 39, and 46, and followup fieldwork Sites 2, 15, 17, 18, 19, 22, 26, and 47. At 200 ppm and the model default values, more than 99.9 percent of children 0 to 6 years old would have blood lead levels less than or equal to 10 micrograms per deciliter (μg/dL). This level is the lower bound of the range identified by the Centers for Disease Control (CDC) as where effects may be observed in some individuals (Wakeman, 1991).

ES.7.1* Current Land Use Conditions

A summary of risks and hazards estimated under current land use conditions is presented in Table ES-4* for the 11 receptor populations quantitatively evaluated in the Baseline RA. As in the Baseline RA, risks and hazards for all currently exposed populations via all pathways quantitatively evaluated are below the lower bound of the National Contingency Plan (NCP) risk range of 1E-06 to 1E-04 and 1, respectively. As in the Baseline RA, of the current receptors, those whose potential exposure yields the highest risks and hazards are the open detonation (OD) pit/open burning tray workers, whose multiple pathway risk and hazard are 4E-07 and 2E-01, respectively. These results are slightly lower than or equal to those calculated in the Baseline RA (8E-07 and 2E-01, respectively (Dames & Moore, 1992a)).

ES.7.2* Future Land Use Conditions

A summary of the risks and hazards estimated under future land use conditions is presented in Table ES-5* for future residents, military personnel, industrial personnel, farmers, hunters, and construction workers.

Risk assessment results for pathways 6, 7, 8, 10, and 11 (Site 31 only) are discussed in Section ES.7.2 of the Baseline RA and are not repeated herein. Pathways 1, 2, 3, 5, and 12 are quantitatively evaluated in this addendum; their impacts on future cancer risk estimates and noncarcinogenic hazard estimates--as well as identification of the dominant contaminants of concern, and conclusions--are discussed below.

Although residential development of the ADA Area was quantitatively evaluated, it is unlikely given the high probability that unexploded ordnance (UXO) is located throughout this area. Unrestricted future land use scenarios (e.g., residential, agricultural, recreational, and light industrial) in the ADA Area--which result in some of the highest risks and hazards calculated in this addendum--are not likely to occur unless the area is fully remediated and UXO is removed. Therefore, estimated risks and hazards at ADA Area followup fieldwork Sites 15, 17, 18, and 19 may be unreasonably high, because it is not likely that the unrestricted land uses will become operable.

ES.7.2.1* Future Residential Land Use Conditions. The following conclusions were drawn from the evaluation of risks and hazards under the future residential land use scenario, which is assumed to be more conservative than the other five future land use scenarios (light industrial, military, construction, agricultural, and recreational) evaluated in the Baseline RA and in this addendum. These conclusions, while not exhaustive, are intended to aid readers in sorting through the many risks and hazards calculated for this scenario.

(1) At four of the 16 followup fieldwork sites--Sites 2, 26, 30, and 44 Location II--one of the following two conditions applies. Either

multipathway carcinogenic risks under all future land use scenarios evaluated are below the NCP risk range of 1E-04 to 1E-06, and multipathway noncarcinogenic hazards are less than 1; or no carcinogenic risks are calculated because appropriate slope factors are not available for any of the contaminants of concern, and multipathway noncarcinogenic hazards are less than 1.

Sites 2 and 44 Location II were not previously sampled; therefore, no results were presented for these sites in the Baseline RA. Conclusions for Sites 26 and 30, based on followup fieldwork results, are similar to those presented for these sites in the Baseline RA (Dames & Moore, 1992a).

(2) At one of the remaining 12 followup fieldwork sites--Site 36--the multipathway potential carcinogenic risk is below the risk range of 1E-04 to 1E-06, and the multipathway noncarcinogenic hazard exceeds 1. These conclusions are the same as those presented for Site 36 in the Baseline RA (Dames & Moore, 1992a).

(3) At one of the remaining 11 followup fieldwork sites--Site 22--the multipathway potential carcinogenic risk is greater than 1E-06, but less than 1E-05, and the multipathway noncarcinogenic hazard exceeds 1. The carcinogenic risk result (9E-06) is slightly greater than that calculated in the Baseline RA (1E-06), while the noncarcinogenic result (2) is slightly lower than that (3) calculated in the Baseline RA (Dames & Moore, 1992a).

(4) At two of the remaining 10 followup fieldwork sites--Sites 48 and 50--multipathway carcinogenic risks are greater than 1E-05, but less than or equal to 1E-04, and multipathway noncarcinogenic hazards are less than 1. These conclusions are the same as those presented for Sites 48 and 50 in the Baseline RA (Dames & Moore, 1992a).

(5) At the remaining eight followup fieldwork sites--Sites 5, 11, 12, 15, 17, 18, 19, and 47--multipathway carcinogenic risks are equal to or exceed 1E-04, and multipathway noncarcinogenic hazards are equal to or exceed 1. These conclusions are similar to those presented for these sites in the Baseline RA (Dames & Moore, 1992a).

ES.7.2.1.1* <u>Discussion of Conclusions for Carcinogenic Risk Estimates</u>. As in the Baseline RA, the ingestion of contaminated drinking water (pathway 5) is the only pathway that significantly contributes to the multipathway risk at five of the followup fieldwork sites--Sites 11, 12, 18, 47 (flood gravel and basalt aquifers), and 50. These are five of the 11 sites with multipathway carcinogenic risk estimates within the NCP risk range of 1E-04 to 1E-06 or exceeding the upper bound of this range (see (3), (4), and (5) above). As in the Baseline RA, at these five sites, arsenic is a dominant contaminant of concern for pathway 5. For example, if this contaminant and pathway are not considered, multipathway carcinogenic risks decrease by 1 to 2 orders of magnitude, though most are still within the NCP risk range of 1E-04 to 1E-06.

In general, from two to 10 groundwater samples were collected at each of the five sites listed above; although this is a relatively small number of samples, arsenic was detected in almost every sample. Detected concentrations of arsenic generally range from 5 to 40 micrograms per liter (μg/L), which exceeds the maximum background groundwater arsenic concentration of 1 μg/L. It should be noted, however, that all detected groundwater concentrations of arsenic are less than its maximum contaminant level (MCL) of 50 μg/L.

Although oral carcinogenicity data for arsenic are based on epidemiology studies with over 40,000 participants, some disagreement continues among U.S. Environmental Protection Agency (EPA) regulators, and new data are evaluated as they become available (USEPA, 1992c). The results of epidemiological studies in Taiwan, Chile, Argentina, and Mexico indicate an increased skin cancer prevalence associated with arsenic exposure (USEPA, 1992c). The exposed Taiwanese population also had elevated standard mortality ratios attributable to cancers of the

bladder, lung, liver, kidney, skin, and colon. Based on increased skin cancer incidence in orally exposed individuals, EPA classifies arsenic in weight-of-evidence Group A (human carcinogen; USEPA, 1992a). Possible confounding factors in the Taiwanese study include the role of other drinking water contaminants, dietary factors, and experimenter scoring bias (USEPA, 1988c). Furthermore, the extrapolation model used to estimate low dose risks may have been overly conservative because of the possibility of low dose detoxification activity (Marcus and Rispin, 1988). Nevertheless, a lack of knowledge about the exact shape of the extrapolated dose-response curve does not nullify the extensive weight of evidence associating arsenic exposure with skin cancer induction (USPHS, 1990).

Crop ingestion (pathway 12) is the only significant pathway for carcinogenic risks at four of the remaining six followup fieldwork sites (Sites 5, 15, 17, and 19) with multipathway carcinogenic risks within the NCP risk range of 1E-04 to 1E-06 or exceeding the upper bound of this range. These results are similar to those presented for these sites in the Baseline RA (Dames & Moore, 1992a). If crop ingestion is not considered at these sites, risks decrease by 1 to 2 orders of magnitude, but in most cases are still within the NCP risk range of 1E-04 to 1E-06. As noted in Section 7.0,* certain future residents may not grow and ingest their own crops; therefore, this pathway may not be applicable to all future residents. Management decisions based on results of the crop ingestion pathway should be withheld until further data become available to document the legitimacy of this pathway at UMDA (e.g., "pilot" crop growing, whereby crops are grown in contaminated UMDA soil, irrigated with contaminated groundwater, and then sampled and analyzed). It is primarily concentrations of RDX and TNT in surface soil that contribute to the risks estimated for pathway 12 at these sites. RDX and TNT were generally detected in more than half of the surface soil samples collected, though they were detected in only one surface soil sample at certain sites. Concentrations of RDX in surface soil range from 0.4 to 1,600 micrograms per gram (μg/g), while concentrations of 2,4,6-TNT range from 0.8 to 43,000 μg/g.

2,4,6-TNT is classified as an EPA Group C carcinogen (USEPA, 1992c), based on the combined tumor incidence in rats and mice exposed to dietary 2,4,6-TNT for 2 years (Furedi et al., 1984a; 1984b). Female rats exposed to 50 milligrams per kilogram per day (mg/kg/day) of 2,4,6-TNT had an increased incidence of combined transitional cell papillomas and carcinoma of the urinary bladder. Urinary tract hyperplasia in both sexes supports the finding of renal carcinogenicity. Exposed female mice show an increased incidence of malignant lymphoma and leukemia of the spleen, compared with untreated controls. For mice, the total incidence of hematopoietic tumors in all organs is not significantly treatment-related. According to National Technology Program Guidelines (McConnell et al., 1986), only the total incidence of hematopoietic tumors, rather than the incidence in any single organ, should be considered in the weight-of-evidence classification. The Group C classification is justified, because verified tumorigenicity is observed in only one species (USEPA, 1986a).

RDX is carcinogenic in one of three rodent bioassays (Lish et al., 1984). However, technical flaws in this study involve reduction in the highest dietary level given to female mice because of excessive mortality, sample contamination with 3 to 10 percent HMX, and the lack of statistically significant differences when the incidences of adenomas and carcinomas are analyzed separately (USEPA, 1988d). Tumor incidence in rats is not increased in either of two lifetime bioassays (Levine et al., 1983; Hart, 1977). Based on the mouse tumor incidence and the absence of effects in rats, RDX is considered a Group C carcinogen (possible human carcinogen; USEPA, 1986a; 1991d). Despite technical flaws in the Lish study, the confidence in this weight-of-evidence classification should be considered high.

Both pathways 2 and 12 significantly contribute to the estimated multipathway risk at Sites 22 and 48, with various contaminants dominating risks via these two pathways. The multipathway risk calculated for Site 22 (9E-06) is greater than that calculated in the Baseline RA (1E-06), primarily due to the detection of beryllium, which was detected only during followup fieldwork. It should be noted that the

maximum concentration of beryllium, 1.89 $\mu g/g$, is only slightly greater than both the background comparison criterion of 1.86 $\mu g/g$ and the sample detection limit of 1.86 $\mu g/g$. Also, only one of 30 soil samples at this site exceeded the background comparison criterion.

Beryllium is classified as Group B2 (probable human carcinogen) on the basis of tumor induction in animals administered beryllium salts by inhalation or by intravenous or intramedullary injection (USEPA, 1992c). Analysis of the only available oral study (Schroeder and Mitchener, 1975) does not indicate a statistically significant increase in gross tumors in rats exposed for life to beryllium sulfate in drinking water. However, EPA uses this study as the basis for an oral slope factor, because the tumor incidence is not significantly increased (USEPA, 1992c). Therefore, the oral slope factor is suspect because of the lack of adequate route-specific data.

ES.7.2.1.2* Discussion of Conclusions for Noncarcinogenic Hazard Estimates. As in the Baseline RA, four of the 10 sites that are listed in conclusions (2), (3), (4), and (5) for the future residential land use scenario (Section ES.7.2.1*) as having multipathway noncarcinogenic hazards that are equal to or exceed 1 are determined to have hazards that only slightly exceed 1 (i.e., are between 1 and 10). These are Sites 11, 12, 18, and 22. As noted in Section 7.0,* it is appropriate to segregate chemical-specific hazards at some followup fieldwork sites (e.g., Sites 11 and 22), because target organ effects or mechanisms of action differ between the contaminants of concern. In some cases, noncarcinogenic hazards are reduced to below 1 if chemical-specific hazards are considered separately. As in the Baseline RA, the remaining six followup fieldwork sites that are noted in conclusions (2) and (4)--Sites 5, 15, 17, 19, 36, and 47--have multipathway noncarcinogenic hazards that exceed 1 by more than an order of magnitude.

At followup fieldwork Sites 11 and 12, the ingestion of contaminated drinking water (pathway 5) is the only pathway whose hazard index significantly contributes to the multipathway hazard estimates, and arsenic is the dominant contaminant of

concern. For example, if this contaminant and pathway are not considered, multipathway noncarcinogenic hazards at these sites range from 2E-04 to 8E-01, decreasing by 1 to 4 orders of magnitude and falling below 1. As noted in Section ES.7.2.1.1,* arsenic was detected in almost every sample collected. Detected concentrations of arsenic, while exceeding the maximum background groundwater concentration of 1 μg/L, are below the MCL of 50 μg/L.

Although oral toxicity data for arsenic are based on epidemiology studies with over 40,000 participants, some disagreement continues among EPA regulators, and new data are evaluated as they become available (USEPA, 1992c). The oral reference dose is based on findings of hyperpigmentation, keratosis, and vascular complications in a Chinese population exposed to arsenic in drinking water (Tseng, 1977; Tseng et al., 1968). Although these findings provide the most statistically robust dose-response relationship between arsenic exposure and toxicity, limitations include the relatively small proportion of older subjects, who are more likely to show symptomology; inadequate knowledge about biological detoxification rates; the possible contributing role of other factors, such as aqueous humic substances, other dietary elements, and the background contribution from drinking water itself; and the possible role of arsenic as an essential nutrient, which--based on experimental evidence--is plausible in goats, rats, and chickens, but has not been adequately demonstrated in humans (USEPA, 1988c; 1992c; USPHS, 1990).

The authors of the Agency for Toxic Substances and Disease Registry (ATSDR) toxicological profile (USPHS, 1990) state that the no observed adverse effects level (NOAEL) for chronic inorganic arsenic exposure is between 5E-04 and 1E-02 mg/kg/day, and that the average background rate is approximately 1E-03 mg/kg/day. EPA (1992) calculates a NOAEL of 8E-04 mg/kg/day, and also adds an uncertainty factor of 3 to account for incomplete knowledge about reproductive effects and sensitive populations. Because of the uncertainty associated with possible adverse health effects so close to background intake levels, only medium confidence can be placed in the reference dose.

As in the Baseline RA, at followup fieldwork Sites 5, 15, and 19, crop ingestion (pathway 12) is the only pathway whose hazard index significantly contributes to the multipathway hazard estimates. If crop ingestion is not considered at these sites, hazards decrease by 1 to 2 orders of magnitude. As noted in Section ES.7.2.1.1,* because some future residents may not grow and ingest their own crops, this pathway may not be applicable to all future residents. Surface soil concentrations of RDX and TNT are the primary contributors to the noncarcinogenic hazard estimates at these sites. Concentrations of RDX in surface soil range from 0.4 to 1,600 $\mu g/g$, while concentrations of 2,4,6-TNT range from 0.8 to 43,000 $\mu g/g$.

The oral reference dose for 2,4,6-TNT is based on somewhat conflicting data from subchronic and chronic animal bioassays of dogs, mice, and rats. Although data suggest that dogs are the most sensitive and most appropriate species for quantitative risk assessment (USEPA, 1989f), they seem unusually sensitive when compared to rodents. This sensitivity may be partially attributable to the method of administration (oral capsule) used by Levine et al., 1983. Consequently, EPA calculates the reference dose based on a subchronic lowest observed adverse effects level (LOAEL) and application of an uncertainty factor of 1,000, instead of the more traditional 10,000 (USEPA, 1989f). EPA rates confidence in the reference dose as medium, because adverse effects--particularly hematopoietic effects--occur at higher doses in other species, and because of the lack of reproductive data (USEPA, 1992c). Considering the entire available data base, the use of an uncertainty factor of 1,000 seems reasonable.

The principal study on which the reference dose for RDX is based is a 2-year feeding experiment in which concentration-related mortality, cataracts, hepatoxicity, and renal toxicity occurred in treated rats (DOD, 1983). The no observed effects level (NOEL) for these effects is 0.3 mg/kg/day, and the LOAEL for inflammation of the prostate is 1.5 mg/kg/day. The NOAEL in a lifetime mouse feeding study is 7.0 mg/kg/day (DOD, 1984). In 90-day oral studies, groups of cynomegalus monkeys show central nervous system disturbances, characterized primarily by tonic-clonic

convulsions, at 10 mg RDX/kg/day (Martin and Hart, 1974). The NOAEL from this study is 1 mg/kg/day. These findings are relevant, because exposed humans also show central nervous system effects, including convulsions, unconsciousness, and disorientation (USEPA, 1988). EPA considers confidence in both the principal study and the data base to be high (USEPA, 1991). The principal study clearly identifies a concentration-response relationship, a NOAEL, and a LOAEL. Furthermore, the reference dose is supported by subchronic data in nonrodent species, and the data base consists of most relevant toxicological endpoints, including developmental effects.

As in the Baseline RA, pathways 2 (ingestion of contaminated soil) and 12 (crop ingestion) present the greatest potential noncarcinogenic hazards for future residents at followup fieldwork Sites 17, 22, and 36. Pathways 5 (ingestion of contaminated drinking water) and 12 present the greatest potential hazards at Sites 18 and 47. Dominant contaminants of concern at these five sites vary with each pathway.

ES.7.2.1.3* <u>Conclusions for the Lead Uptake/Biokinetic Model Results</u>. Table ES-6* presents results of the lead UBK model for the 15 UMDA sites evaluated. These results indicate that lead concentrations at several sites may yield unacceptable exposure levels; this determination is based on the percentage of the population to be protected and the selected blood lead cutoff level. For example, lead concentrations at four followup fieldwork sites (Sites 2, 17, 19, and 22) may be considered unacceptable if the goal is to have 95 percent or more of the population with blood lead levels below the CDC-recommended cutoffs of 10 μg/dL or 15 μg/dL. If the goal is 99 percent of the population with blood lead levels less than 10 μg/dL and 15 μg/dL, then lead concentrations at seven (Sites 2, 15, 17, 19, 22, 26, and 47) and four sites (Sites 2, 17, 19, and 22), respectively, may be considered unacceptable. These results are generally similar to those presented in the Baseline RA, with the exception of Site 2, which was not previously sampled (Dames & Moore, 1992a).

TABLE ES–6*

Results of the Uptake/Biokinetic Model for Lead at Selected UMDA Sites

	Site No.	Concentration in Groundwater (ug/l)(a)	Concentration in Soil (mg/kg)(b)	Mean Blood Lead Concentration (ug/dl)(c)	Cutoff of 10 ug/dl		Cutoff of 15 ug/dl	
					% Below	% Above	% Below	% Above
**	47	5.84 (floodgravel)	428	5.29	96.65	3.35	99.86	0.14
		3.04 (basalt)		5.11	97.49	2.51	99.90	0.1
	13	4.53	321	4.3	99.26	0.74	99.98	0.02
	14	1.38	330	4.16	99.41	0.59	99.99	0.01
**	15	ND (d)	401	7.45	97.98	2.02	99.93	0.07
**	17	NA (d)	837	8.66	67.32	32.68	94.48	5.52
**	18	1.41	250	3.48	99.88	0.12	100	0
**	19	9.53	1225	12.35	29.37	70.63	72.63	27.37
	32 Loc II	NA (d)	1263	12.3	29.37	70.63	72.63	27.37
	1	NA (d)	2618	23.95	0.96	99.04	11.37	88.63
**	26	NA (d)	469	5.52	95.85	4.15	99.8	0.2
	37	NA (d)	355	4.55	98.86	1.14	99.97	0.03
	46	NA (d)	201	3.24	99.94	0.06	100	0
**	22	NA (d)	979	9.87	54.62	45.38	88.93	11.07
	39	NA (d)	288	3.98	99.62	0.38	99.99	0.01
**	2	NA (d)	1700	16.05	11.37	88.63	44.85	55.15

(a) - The groundwater concentration is the 95 percent upper confidence limit on the arithmetic mean of groundwater data. Non-detects are replaced with one-half the detection level.
(b) - The soil concentration is the 95 percent upper confidence limit on the arithmetic mean of surface soil data (samples less than 2 feet deep). Non-detects are replaced with one-half the detection level.
(c) - The mean blood lead concentration presented is the geometric mean.
(d) - The program default value of 4.0 ug/l of lead in groundwater is used in the UBK model.
(e) - Only sites with soil concentrations of lead equal to or greater than 200 mg/kg were evaluated using the uptake/biokinetic model.
NA - Not analyzed
ND - Not detected
* - Replaces Table 7-290 in the Baseline RA, Dames & Moore, 1992a.
** - Site at which followup fieldwork was performed.

ES.7.2.2* Future Military Land Use Conditions at Sites in Operable Unit B. The inhalation of contaminated dust (pathway 3) is evaluated for future military personnel using four sites in Operable Unit B (ADA Area) for tank training exercises. At followup fieldwork Site 17, pathway 3 carcinogenic risks are below the lower bound of the NCP risk range of 1E-04 to 1E-06, and noncarcinogenic hazards are less than 1. At Sites 18 and 19, pathway 3 carcinogenic risk estimates are within the NCP risk range of 1E-04 to 1E-06, and noncarcinogenic hazards exceed 1. At Site 15, pathway 3 carcinogenic risk estimates exceed the upper bound of the NCP risk range of 1E-04 to 1E-06, and noncarcinogenic hazards exceed 1. These results are generally slightly lower than those calculated in the Baseline RA (Dames & Moore, 1992a).

Chromium is generally the dominant contaminant of concern for both carcinogenic and noncarcinogenic effects on future military personnel exposed to Operable Unit B contamination via pathway 3. If chromium is not considered, estimated carcinogenic risks range from 1E-06 to 2E-05, decreasing by 1 order of magnitude; noncarcinogenic hazards range from 4E-03 to 10, decreasing by 1 to 2 orders of magnitude and falling below 1 at Site 18. Only two to four samples were collected from surface soil at sites where chromium is the dominant contaminant, but chromium concentrations--ranging from 25 to 8,460 $\mu g/g$--generally greatly exceed the background soil concentration of 32.7 $\mu g/g$.

The inhalation reference dose for chromium is calculated from an air concentration listed in Health Effects Assessment Summary Tables (HEAST; USEPA, 1991d). Regulators at EPA's Office of Research and Development (ORD) are reviewing the inhalation reference dose concept and have not reinstated inhalation reference doses on the Integrated Risk Information System (IRIS) data base. The reasons for the ORD review include the reputed wide variation in the toxicological response to inhalable contaminant exposure because of the complex structure and mechanics of the respiratory system. Thus, though the reference air concentration cited in HEAST is based on a moderately well-designed occupational study of workers exposed to chromic (VI) acid (Lindberg and Hedenstierna, 1983),

it is not possible to accurately determine a deposited reference dose based on this air concentration. The resulting confidence in the calculated inhalation reference dose is low.

EPA removed the inhalation slope factors for respirable carcinogens from IRIS on January 1, 1991, but unit risks are still listed. The basis for the unit risk for chromium VI (the only carcinogenic form of chromium) is a series of occupational studies that consistently show positive concentration-response relationships between chromium exposure and lung cancer induction (USEPA, 1992), warranting an EPA Group A classification (human carcinogen). The study used for unit risk determination (Mancuso, 1975) was generally well conducted, but contains several factors that may have either overestimated or underestimated risk. The use of older exposure data (when occupational air concentrations were not well monitored) and the assumption that worker smoking frequency is the same as the general population probably contribute to overestimation of carcinogenic risk. The risk for chromium VI, based on concentration-response data for total chromium (chromium III and VI), is probably underestimated. EPA proposes that the extent of overestimation and underestimation is approximately equal; therefore, high confidence is placed in the unit risk (USEPA, 1984). However, because of the factors discussed above, confidence in the inhalation slope factor derived from the unit risk value is considered to be low.

ES.7.2.4* <u>Dominant Contaminants of Concern</u>. Although the contaminants that significantly contribute to risks or hazards may have shifted for a few sites based on followup fieldwork, in general, the major contributors remained the same as those discussed in the Baseline RA (i.e., arsenic, RDX, 2,4,6-TNT, and chromium for both risks and hazards). Of the 64 contaminants of concern in soil or groundwater at one or more UMDA sites, 29 significantly contribute to risk or hazard estimates via one or more pathways. These 29 contaminants are listed in Table ES-7* according to the sites and pathways at which they dominate carcinogenic risks or noncarcinogenic hazard indices. Eight contaminants significantly contribute to only carcinogenic risks at one or more sites, while 11 significantly contribute to only noncarcinogenic

TABLE ES-7*

Summary of Contaminants Which Significantly Contribute to Risk and Hazard Estimates for Baseline Risk Assessment Umatilla Army Depot Activity, Hermiston, Oregon (a)

Contaminant	Pathway 1: Cancer	Pathway 1: Noncancer	Pathway 2: Cancer	Pathway 2: Noncancer	Pathway 3: Cancer	Pathway 3: Noncancer	Pathway 5: Cancer	Pathway 5: Noncancer
	Sites at Which Contaminant Significantly Contributed to Risks and/or Hazards via:							
TAL Inorganics:								
Antimony				1, 15**, 19**, 32 II, 47**				8/31, 11**, 19**, 41
Arsenic			1, 13, 15**, 18**, 19**, 57 III		19**		4/47/67 (F), 8/31, 11**, 12, 13/57 II, 14/38, 15/55, 16, 18, 19**, 41, 50**, 57 I, 57 III	4/47/67 (F), 8/31, 11**, 13/57 II, 14/38, 15/55, 16, 18, 19**, 41, 57 I, 57 III
Barium				32 II				
Beryllium			1, 15**, 17**, 22**, 56				4/47/67 (F), 19**, 41	
Cadmium				15**, 36**, 47**	19**			
Chromium				15**	14 (c), 15**, 18**, 19**	14 (c), 15**, 18** (c), 19** (c)		
Cobalt				15**, 16, 17**, 36**				
Copper				1, 19**, 32 II				
Mercury								
Nickel								
Selenium								11**
Thallium				1, 15**, 25 I, 25 II				
Vanadium								8/31, 11**, 16, 41
Zinc				19**, 32 II				
Explosives:								
2,4-DNT	4, 15**, 32 I, 32 II		4, 32 I, 32 II				4/47/67 (F,B)	
2,6-DNT	13							
RDX			4, 5**, 15**				4/47/67 (F,B)	4/47/67 (F,B)
Tetryl								
1,3,5-TNB		4, 5**, 15**, 31		4, 19**, 31				4/47/67 (F,B)
2,4,6-TNT	4, 5**, 15**, 17**, 19**, 31	4, 5**, 15**, 19**, 31	4, 5**, 19**, 31	4, 5**, 19**, 31			4/47/67 (F)	4/47/67 (F,B)
Other Inorganics:								
Nitrite/nitrate								8/31
TCL Volatiles:								
Benzene								
Trichloroethylene								
TCL Semivolatiles:								
bis(2-Ethylhexyl)phthalate			37					
PAHs			12**, 47**					
Pesticides/PCBs:								
DDD			48**					
DDE			48**					
DDT			48**					
PCB 1260	47**		47**					

TABLE ES-[illegible] (cont'd)

Summary of Contaminants Which Significantly Contribute to Risk and Hazard Estimates for Baseline Risk Assessment Umatilla Army Depot Activity, Hermiston, Oregon (a)

Contaminant	Pathway 6 (b): Cancer	Pathway 7 (b): Cancer	Pathway 11: Cancer	Pathway 11: Noncancer	Pathway 12: Cancer	Pathway 12: Noncancer
	Sites at Which Contaminant Significantly Contributed to Risks and/or Hazards via:					
TAL Inorganics:						
Antimony						
Arsenic					1, 13, 14, 16, 18**, 41, 57 I, 57 II, 57 III	
Barium						
Beryllium					1, 22**, 56	
Cadmium						15**, 36**, 37, 38, 47**
Chromium						
Cobalt						
Copper						
Mercury						13, 57 II
Nickel						18**
Selenium						
Thallium						
Vanadium						
Zinc						
Explosives:						
2,4-DNT		4/47/67 (F,B)			11**, 32 I, 32 II, 47**, 67	15**, 32 I, 32 II
2,6-DNT					11**, 13, 15**	13
RDX		4/47/67 (F,B)			4, 5**, 9, 16, 17**, 47**, 52, 67	4, 5**, 9, 15**, 16, 17**, 47**, 52, 67
Tetryl						13, 57 II
1,3,5-TNB						4, 5**, 15**, 19**, 31, 47**, 67
2,4,6-TNT		4/47/67 (F)	31	31	4, 5**, 16, 19**, 31, 38, 47**, 67	4, 5**, 15**, 16, 17**, 19**, 31, 38, 47**, 67
Other Inorganics:						
Nitrite/nitrate						
TCL Volatiles:						
Benzene	8/31					
Trichloroethylene	4/47/67 (F)					
TCL Semivolatiles:						
bis(2-Ethylhexyl)phthalate					37	37
PAHs					12**, 47**	
Pesticides/PCBs:						
DDD					30**, 48**	
DDE					30**, 48**	
DDT					30**, 48**	
PCB 1260					47**	

(a) - Contaminants, sites, and pathways are listed in this table only if risks and/or hazards exceeded 1E-06 or 1, respectively. Sites 2, 10, 21, 26, 27, 29, 34, 35, 39, 44II, 45 I, 45 II, 46, 53, 60, and 61 I were not included since both risks and hazards were less than 1E-06 and 1, respectively.
(b) - A noncancer column is not presented for Pathways 6 & 7 since no sites yielded hazard indices exceeding 1 for these pathways.
(c) - Only the military (tank training) land use scenario yielded risks exceeding 1E-06 or hazards exceeding 1, respectively, at this Operable Unit B site.
NOTE: The following sites were combined for the purposes of groundwater evaluation: 4/47/67, 8/31, 13/57 II, 14/38, 15/55. For Sites 4/47/67, F denotes the flood gravel aquifer and B denotes the basalt aquifer.
*-Replaces original Table 9-4 in the Final Baseline RA; Dames & Moore, 1992a.
** - Site at which followup fieldwork was conducted.

hazards. Ten contaminants significantly contribute to both carcinogenic risks and noncarcinogenic hazards. Although 29 dominant contaminants of concern are identified, a discussion of confidence in the health-based criteria focuses on those contaminants that present the greatest impacts on human health. Information about confidence in the reference dose or weight-of-evidence classifications for the other dominant contaminants of concern is provided in Appendix D of the Baseline RA.

ES.7.2.4.1* Carcinogenic Risks. Of the 16 contaminants that significantly contribute to carcinogenic risks, arsenic, RDX, 2,4,6-TNT, and chromium are the major contaminants of concern for the pathways and sites at which carcinogenic risks are within the NCP risk range of 1E-04 to 1E-06 or exceed the upper bound of this range. Weight-of evidence classifications and other issues related to these contaminants are discussed in detail in Section 9.3.2.1.1 of the Baseline RA. In the Baseline RA, nickel was a significant contributor to risks at Site 18; however, with the addition of followup fieldwork results, the exposure point concentration of nickel--and, therefore, the calculated risks--is lower, and nickel no longer significantly contributes to risks at Site 18. The remaining results are the same as those presented in the Baseline RA (Dames & Moore, 1992a).

Five of the 16 contaminants that significantly contribute to carcinogenic risks affect risks only via one or two pathways at one site. Note that some contaminants--though contributing to the total carcinogenic risk estimates that are within or exceed the NCP risk range of 1E-04 to 1E-06--have chemical-specific risks (provided in parentheses below) that are less than the lower bound of this range.

- Benzene--Carcinogenic risks for future residents via inhalation of volatile contaminants emitted from groundwater during showering (pathway 6) at Sites 8 and 31 (risk = 4E-06). Note that benzene is the only contaminant of concern for pathway 6 at these two sites. These results are the same as those presented in the Baseline RA (Dames & Moore, 1992a).

- Cadmium--Carcinogenic risks for future residents via inhalation of contaminated soil as airborne dust (pathway 3) at followup fieldwork Site 19 (risk = 2E-06). These results are the same as those presented in the Baseline RA (Dames & Moore, 1992a).

- Trichloroethylene--Carcinogenic risk for future residents via pathway 6 at Sites 4 and 67 (flood gravel aquifer) and followup fieldwork Site 47 (risk = 2E-06). Note that trichloroethylene is the only contaminant of concern for pathway 6 at these three sites. The inhalation unit risk for trichloroethylene is a source of continuing controversy because of questions regarding the most appropriate data base for risk estimation and the best allometric method for interspecies extrapolation (USEPA, 1987; Ris, 1991). Furthermore, EPA is debating whether the B2 or C weight-of-evidence classification is more appropriate (Ris, 1991). The various assessments for trichloroethylene do not clearly indicate if risk is underestimated or overestimated.

- bis(2-Ethylhexyl)phthalate--Carcinogenic risk for future residents via inadvertent ingestion of contaminated soil (pathway 2) and consumption of crops irrigated by contaminated groundwater or grown in contaminated soil (pathway 12) at Site 37 (pathway 2 and 12 risks = 6E-06 and 1E-04, respectively). Note that Site 37 is the only site at which DEHP is identified as a contaminant of concern in surface soil or groundwater. This contaminant induces liver cancer and hepatic nodules in rats and mice (Reddy and Lalwani, 1983; NTP, 1982). Because primates may be less sensitive to neoplasia from such chemicals, the calculated slope factor may overestimate human health risk. These results are the same as those presented in the Baseline RA (Dames & Moore, 1992a).

- Polynuclear aromatic hydrocarbons (PAHs)--Carcinogenic risk for future residents via pathways 2 and 12 at followup fieldwork Sites 12

(pathways 2 and 12 risks = 3E-06 and 2E-05, respectively) and 47 (pathways 2 and 12 risks = 1E-05 and 7E-05, respectively). Sites 12 and 47 are the only sites at which PAHs were detected in surface soil and/or groundwater. PAHs were not previously detected in soil at Site 12 and, therefore, were not listed as significant contaminants for Site 12 in the Baseline RA.

The remaining contaminants listed in Table ES-7* as dominant contaminants of concern for carcinogenic effects are significant at randomly distributed sites under various pathways. For example, beryllium is a dominant contaminant of concern for carcinogenic effects at 10 sites under three different pathways. Beryllium was not listed as a significant contaminant for Site 22 in the Baseline RA, because it was not previously detected at this site. Beryllium is classified as Group B2 (probable human carcinogen) on the basis of tumor induction in animals administered beryllium salts by inhalation or by intravenous or intramedullary injection (USEPA, 1992c). Analysis of the only available oral study (Schroeder and Mitchener, 1975) does not indicate a statistically significant increase in gross tumors in rats exposed for life to beryllium sulfate in drinking water. However, EPA uses this study as the basis for an oral slope factor, because the tumor incidence is not significantly increased (USEPA, 1992c). Therefore, the oral slope factor is suspect because of the lack of adequate route-specific data.

2,4-DNT is a dominant contaminant of concern for carcinogenic effects at seven sites under four pathways, and 2,6-DNT is a dominant contaminant of concern for carcinogenic effects at three sites under two different pathways. In the Baseline RA, 2,6-DNT was not detected at Site 15, but it became a significant contaminant at this site with the addition of followup fieldwork results. Although mixed isomer DNT (containing primarily the 2,4 isomer) and 2,4-DNT have been extensively investigated for carcinogenicity (USEPA, 1992d), less is known about the 2,6 isomer. The human oral slope factor is based on a lifetime bioassay (Ellis et al., 1979) in which rats received a mixture containing 98.5 to 99 percent 2,4-DNT and 1 to 1.5 percent 2,6-DNT (Lee et al., 1985; USEPA, 1992c). The slope factor is applicable

to 2,4-DNT, technical grade DNT, and--by default--2,6-DNT (USEPA, 1992c). Results of subsequent studies (Leonard et al., 1983, 1986) suggest that 2,6-DNT may be a complete hepatocarcinogen, whereas the 2,4 isomer is active exclusively as a tumor promoter, and 2,6-DNT may be 10 times more potent a carcinogen than 2,4-DNT (USEPA, 1992c). The use of the same potency factor for each isomer is possibly misleading, and the current criterion probably underestimates the health risk attributable to 2,6-DNT.

ES.7.2.4.2* Noncarcinogenic Hazards. Of the 20 contaminants that significantly contribute to noncarcinogenic hazards (Table ES-7*), arsenic, RDX, 2,4,6-TNT, and chromium are the major contaminants of concern for the pathways and sites at which the multipathway noncarcinogenic hazard exceeds 1. These were also the major contaminants listed in the Baseline RA. Confidence in the reference dose and other issues related to these contaminants is discussed in detail in Section ES.7.2.1.2*. Lead--evaluated using the UBK model described in Section ES.7 of the Baseline RA--is a significant contaminant of concern at several of the 15 UMDA sites evaluated. The number of sites at which lead concentrations yield unacceptable exposures is dependent on the percentage of the population to be protected and the blood lead cutoff level. Results of the UBK model are discussed in detail in Section ES.7.2.1.3*. In the Baseline RA, nickel was a significant contributor to hazards at Site 18; however, with the addition of followup fieldwork results, the exposure point concentration of nickel--and, therefore, the hazard quotient--was lowered, and nickel no longer significantly contributes to the hazard index at Site 18.

Eight of the 20 contaminants that significantly contribute to noncarcinogenic hazards affect hazards via only one or two pathways at one site. Note that some contaminants, though contributing to the total multipathway noncarcinogenic hazard estimates that exceed 1, have chemical-specific hazards (provided in parentheses below) of less than 1.

- Barium--As in the Baseline RA, noncarcinogenic hazards for future residents via pathway 2 at Site 32 Location II (hazard index = 1).

- bis(2-Ethylhexyl)phthalate--As in the Baseline RA, noncarcinogenic hazards for future residents via pathway 12 at Site 37 (hazard index = 9E-01).

- 2,6-DNT--As in the Baseline RA, noncarcinogenic hazards for future residents via pathway 12 at Site 13 (hazard index = 3). 2,6-DNT is the only contaminant of concern that significantly contributes to noncarcinogenic hazards via pathway 12 at Site 13.

- Mercury--As in the Baseline RA, noncarcinogenic hazards for future residents via pathway 12 at Sites 13 and 57 Location II (hazard index = 2).

- Nitrite/nitrate--As in the Baseline RA, noncarcinogenic hazards for future residents via ingestion of contaminated drinking water (pathway 5) at Sites 8 and 31 (hazard index = 0.3).

- Selenium--As in the Baseline RA, noncarcinogenic hazards for future residents via pathway 5 at followup fieldwork Site 11 (hazard index = 2E-01).

- Tetryl--As in the Baseline RA, noncarcinogenic hazards for future residents via pathway 12 at Sites 13 and 57 Location II (hazard index = 1).

- Zinc--As in the Baseline RA, noncarcinogenic hazards for future residents via pathway 2 at Site 32 Location II (hazard index = 1E-01).

The remaining eight contaminants listed in Table ES-7* as dominant contaminants of concern for noncarcinogenic effects are significant at randomly distributed sites under various pathways. These contaminants are the same as those discussed in the Baseline RA. Confidence in the reference dose for six of these contaminants is summarized below:

- Antimony--The oral reference dose is based on a lifetime rat study (Schroeder et al., 1970) using antimony tartrate. The supporting data

base, including toxicological information on other antimony salts, is limited. Consequently, confidence in the reference dose is low (USEPA, 1992c).

- Cadmium--The oral reference dose is based on a well-documented human renal wet weight required of the expression of the most sensitive endpoint, proteinuria (USEPA, 1992c). The authors of a recent toxicokinetic model (USEPA, 1985), who assume a 0.01 percent daily cadmium elimination rate, determine that a daily dietary level of 1E-02 mg/kg/day is the highest level not associated with an elevated renal wet weight and subsequent proteinuria. EPA applies an uncertainty factor of 10 to account for susceptible individuals (USEPA, 1992). Because the NOAEL is derived from a large toxicological and toxicokinetic data base in both humans and animals, confidence in the reference dose is high.

- Cobalt--EPA Region III, which cites the low oral reference dose for cobalt used in this Baseline RA (USEPA, 1991g), considers the reference dose obsolete and possibly about 2 orders of magnitude too low (Smith, 1992). The reference dose is based on an EPA memorandum (USEPA, 1990) concerning sensitization reactions in human volunteers. According to this memorandum, Veien et al. (1987) orally challenged 47 cobalt- and nickel-exposed workers with 1 milligram cobalt (as cobalt sulfate) once a week for 3 weeks. The challenge was used as a potential treatment for eczema in the workers. A total of 28 workers developed dermatitis. Using both the oral challenge and dermal patch tests, Veien et al. (1987) determined that the cobalt allergy was systemic. When divided by a standard body weight of 70 kilograms, the oral dose is 0.014 mg/kg/day. Application of an uncertainty factor of 1,000 (10 each for the use of a LOAEL, use of acute data, and protection of sensitive individuals) results in an interim oral reference dose of 1E-05 mg/kg/day. EPA (1990)

proposes that confidence in the reference dose is low, because a NOAEL is not identified and prior exposure to nickel may sensitize individuals to cobalt.

- Copper--The EPA Region III oral reference dose is calculated from the MCL, assuming that the average human weighs 70 kilograms and consumes 2 liters of water daily. EPA's Drinking Water Criteria Document for copper indicates that data are not adequate for the assessment of an oral reference dose (USEPA, 1991d). Because the MCL is based on organoleptic criteria, little confidence can be placed in the reference dose and the overestimation or underestimation of hazards cannot be determined.

- 1,3,5-TNB--The oral reference dose is based on a subchronic study of the structural analog 1,3-DNB (Cody et al., 1981) and is adjusted for molecular weight differences. Because of limitations of the 1,3-DNB data base, and further uncertainties in criteria determination by analogy, confidence in the 1,3,5-TNB reference dose is very low.

- Vanadium--The oral reference dose is very questionable because of an internally inconsistent data base (Schroeder et al., 1970: Stokinger et al., 1953; Domingo et al., 1985; Susic and Kentera, 1986).

ES.7.2.5* Uncertainties. The uncertainties associated with the UMDA risk assessment are fully discussed in Sections ES.7.2.5 and 7.5 of the Baseline RA and are not repeated in this addendum.

Because of the site-specific uncertainties discussed in Sections ES.7.2.5 and 7.5 of the Baseline RA, as well as those uncertainties inherent to the risk assessment process, the Baseline RA and addendum should not be considered as an absolute measurement of risks and hazards posed to current and future populations by exposure to site-related contaminants. Instead, they present a generally conservative evaluation of risks that might exist under the assumed exposure conditions (if no

remediation or institutional controls are applied at a site) and a determination of the need for action at specific sites.

ES.8* PRELIMINARY REMEDIATION GOALS

The PRGs developed for surface soil and groundwater based on land use scenarios, exposure pathways, and specific exposure assumptions are presented in the Baseline RA. These tables differ slightly from those presented in the Baseline RA in that PRGs are included for the four new contaminants of concern based on followup fieldwork results--1,1,1-trichloroethane (previously a contaminant of concern only in subsurface soil, now also a contaminant of concern in surface soil), benzo(a)pyrene, benzo(g,h,i)perylene, and indeno(1,2,3-cd)pyrene. All other PRGs are the same as those presented in the corresponding Baseline RA tables.

ES.8.2.3* PRGs for Lead. The UBK model is run using a 10-μg/L target groundwater PRG for lead, because the exposure point concentration for lead in groundwater at all sites at UMDA is below 10 μg/L. Therefore, if a PRG of 10 μg/L is selected, it may not be necessary to consider remedial alternatives for lead in groundwater. A close evaluation of the UBK model indicates that the output is mainly a function of soil concentration and that alteration of the target PRG for groundwater of 10 μg/L does not significantly impact the soil PRG.

Based on application of the UBK model, two potential PRGs for lead in UMDA soil are identified--200 and 500 mg/kg total lead. At a soil concentration of 200 mg/kg lead, greater than 99.8 percent of an exposed sensitive population (young children) is expected to have blood lead levels of less than or equal to 10 μg/dL. Fifteen sites (Sites 1, 13, 14, 32 Location II, 37, 39, and 46, and followup fieldwork Sites 2, 15, 17, 18, 19, 22, 26, and 47) have lead exposure point concentrations that exceed 200 mg/kg, indicating that they may potentially require consideration of remedial alternatives if a lead PRG of 200 mg/kg is selected. At a soil concentration of 800 mg/kg, approximately 92 percent of the children would have blood lead levels of less than or equal to 10 μg/dL, and more than 99.5 percent of the children would have blood lead levels of less than or equal to 15 μg/dL. Eight sites (Sites 1 and 32

Location II, and followup fieldwork Sites 2, 15, 17, 19, 22, and 26) have lead exposure point concentrations that exceed 500 mg/kg, indicating that they may potentially require consideration of remedial alternatives if a lead PRG of 500 mg/kg is selected.

1.0* INTRODUCTION

This document is an addendum to the Final Baseline Risk Assessment (Baseline RA) for the Remedial Investigation/Feasibility Study (RI/FS) at the Umatilla Depot Activity (UMDA), Hermiston, Oregon. It was prepared for the U.S. Army Environmental Center (USAEC; formerly U.S. Army Toxic and Hazardous Materials Agency (USATHAMA)) under the Base Realignment and Closure (BRAC) Program, Contract No. DAAA15-88-D0008, Delivery Order No. 3. The Baseline RA is conducted in support of the RI/FS for UMDA to verify and characterize environmental contamination at the study sites in terms of potential impacts on human health under current and future land use conditions.

1.1 PURPOSE OF RA ADDENDUM

The purpose of the addendum to the Baseline RA is to evaluate the results of additional field investigation work performed at 16 UMDA sites (Sites 2, 5, 11, 12, 15, 17, 18, 19, 22, 26, 30, 36, 44 Location II, 47, 48, and 50) pursuant to the recommendations of the RI and at the request of USAEC. This followup fieldwork was conducted to confirm conclusions in the August 1992 RI and to better define the extent of contamination at some sites in support of feasibility studies. This addendum assesses the potential present and future health risks posed by contaminants in soil and groundwater in the absence of remediation, and develops preliminary remediation goals (PRGs) for these media if remediation is determined to be a requirement.

1.2 ADDENDUM REPORT ORGANIZATION

The general risk assessment process is described in Section 1.2 of the Baseline RA and is not repeated in this addendum. Similarly, background information on the installation, RI/FS operable units, and the study sites is unchanged from that provided in Section 2.0 of the Baseline RA. Detailed risk assessment results are provided in the remaining sections of this addendum. The document numbering system is the same as that used in the Baseline RA; only those sections that are

amended based on the followup field investigation results are included in the addendum. The amended sections are marked with an asterisk. A section with no asterisk is new to the addendum.

The addendum to the Baseline RA consists of the following:

- Section 1.0*--An introduction that presents the outline and purpose of the addendum.
- Section 2.0*--Although not affected by the followup fieldwork, Section 2.0, Installation Background and Site Description, is repeated in this addendum for informational purposes.
- Section 3.0*--Data evaluation and identification of contaminants of concern for the 16 sites that are part of the followup field investigation.
- Section 4.0*--A summary of environmental fate and transport properties of the contaminants of concern, including three new contaminants of concern--benzo(a)pyrene, benzo(g,h,i)perylene, and indeno(1,2,3-cd)pyrene.
- Section 5.0*--A summary of toxicity criteria for the contaminants of concern, including the three new contaminants of concern listed above.
- Section 6.0*--Exposure assessment.
- Section 7.0*--Risk characterization and an evaluation of uncertainties.
- Section 8.0*--Development of PRGs.
- Section 9.0*--Summary and conclusions.
- Section 10.0*--References.
- Appendix C*--Environmental fate and transport profiles for the three new contaminants of concern. All other profiles are unchanged and are not repeated in the addendum.

- Appendix E*--Air modeling of fugitive dust concentrations for those sites for which the dust inhalation scenario is applicable because of surface soil sampling results.

Appendices A, B, and D are not affected by the followup field investigation and, therefore, are not included in this RA addendum.

2.0* INSTALLATION BACKGROUND AND SITE DESCRIPTION

Although Section 2.0 is not affected by the followup fieldwork, certain parts are repeated herein for informational purposes. Site descriptions are not repeated for sites at which no additional fieldwork was performed.

2.1* INSTALLATION BACKGROUND

2.1.1* UMDA Location and Physical Setting

UMDA is located in northeastern Oregon--in Umatilla and Morrow Counties--approximately 3 miles south of the Columbia River (see Figure 2-1). The Depot occupies a roughly rectangular area of 19,728 acres, of which 17,054 acres is owned by the U.S. Army; the remaining acreage is covered by restrictive easements (USATHAMA, 1979). Generally, the ground surface within the installation boundaries ranges from relatively flat-to-gently rolling land that is occasionally marked by shallow depressions and ridges.

The primary population centers near UMDA include Hermiston (population 9,870), approximately 8 miles east; Umatilla (population 3,120), approximately 6 miles northeast; and Irrigon (population 865), 2 miles northwest. The total populations of Umatilla and Morrow Counties are approximately 58,100 and 8,000, respectively (Weston, 1989).

The land immediately surrounding UMDA is primarily used for irrigated agriculture. The chief crops are potatoes, sugar beets, alfalfa, and grains. Dryland farming is widespread in the area, with vast fields of wheat grown in the neighboring uplands (NUS Corporation, 1987). Livestock are raised on the surrounding lands, and a large pig farm (reportedly over 17,000 head) is located just south of the Depot (USATHAMA, 1979).

The Union Pacific Railroad tracks run adjacent to UMDA's southern boundary. Interstate 84 runs east-west just south of the Depot, and Interstate 82 runs north-south just east of the Depot.

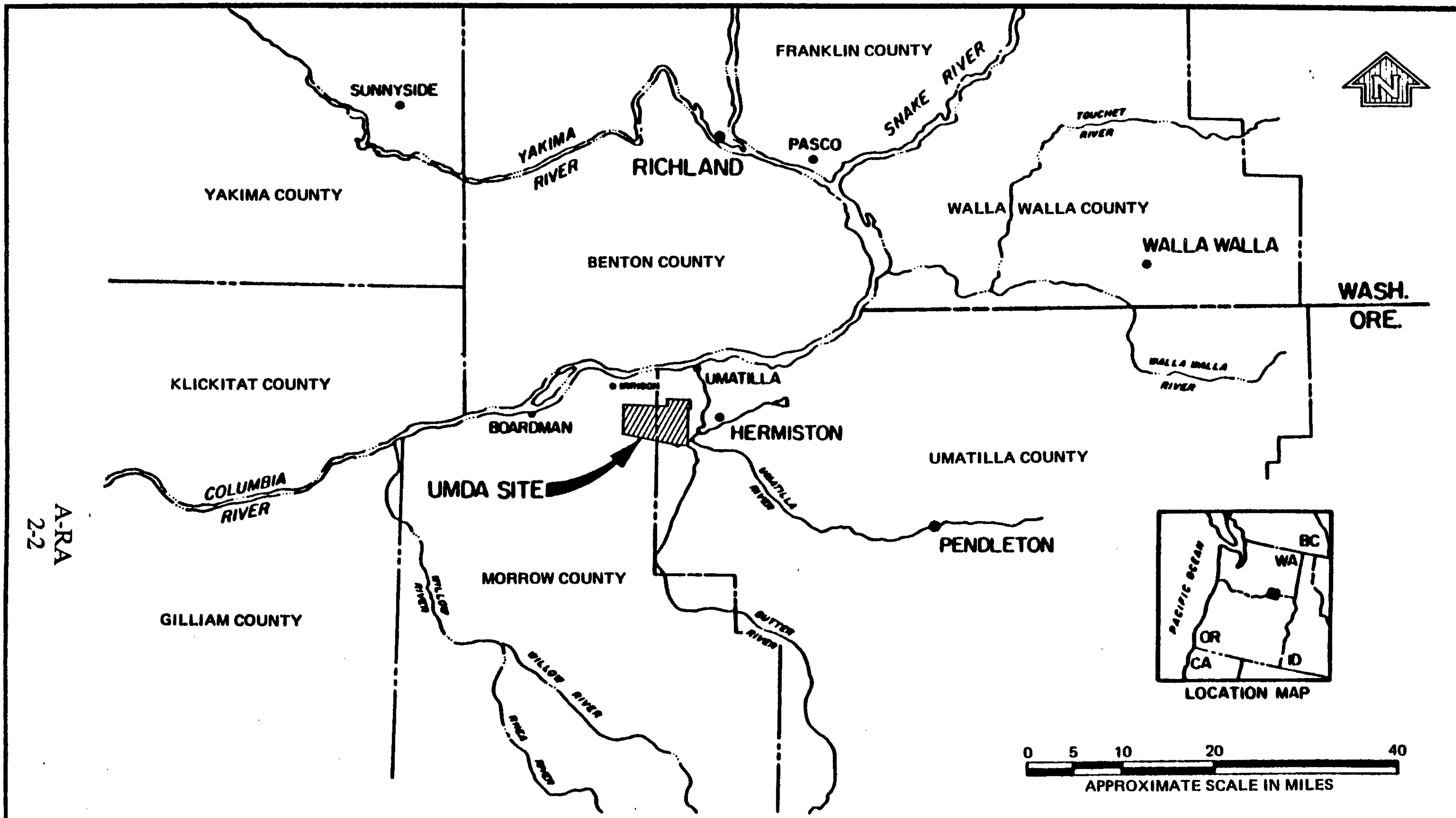

FIGURE 2-1*
FACILITY LOCATION MAP
UMATILLA DEPOT ACTIVITY

SOURCE: NUS Corporation, 1987

Dames & Moore

Other than stormwater drainage, for which no direct information is available, the only surface water on the Depot property is an irrigation canal that cuts diagonally across the extreme northwest corner of the installation. Surface water drainage channels are very poorly developed because of the high permeability of the soil, low precipitation, and recent formation of the landscape. Surface runoff apparently does not travel far, except near the administration area where it is collected by storm sewers and discharged at the Stormwater Discharge Area (Site 30). Groundwater is used in the areas surrounding UMDA to provide domestic and industrial supplies and to irrigate cropland.

2.1.2* History, Present Mission, and Future Use

The original 16,000 acres of land for UMDA was purchased by the U.S. Army in 1940 from private owners and transfer of lands from the U.S. Bureau of Land Management (BLM). Prior to acquisition, these lands were either undeveloped or used for agricultural pursuits, including fruit ranges, dairy farming, and poultry farming. Between 1957 and 1960, approximately 4,000 additional acres of private and public lands around the Depot perimeter was annexed for safety zones. Plate 1 in the map pocket provides a map of the entire Depot.

UMDA was established by the U.S. Army as an ordnance facility for storing conventional munitions in 1941. Subsequently, the functions of the Depot were extended to include ammunition demolition (1945), renovation (1947), and maintenance (1955). In 1962, the Army began to store chemical munitions at UMDA. In August 1973, the installation was redesignated as an "Activity" by the U.S. Army Materiel Command.

The construction of 1,001 ammunition storage igloos began in February 1941. By the end of 1941, the installation began functioning as an ammunition storage facility; in 1947, an ammunition renovation complex was constructed. Two ammunition maintenance buildings were added in 1955 and 1958.

Chemical agent-filled munitions and 1-ton containers of chemical agents have been stored in K block at UMDA since 1962. However, no chemical weapons have been used, manufactured, or tested at the Depot. In addition to the chemical munitions, conventional munitions are stored in magazines and igloos in A-J blocks, as illustrated in Plate 1 in the map pocket. Missiles and missile fuel components, including unsymmetrical dimethyl hydrazine (UDMH) and red fuming nitric acid (RFNA), were stored from the mid-1950s to the early 1960s.

No manufacturing operations have been conducted at UMDA, but munitions testing, rework, demolition, and disassembly operations have been performed in several areas throughout the activity. The Explosive Washout Plant area, located in the central portion of UMDA (see Plate 1 in map pocket of Baseline RA), and the Ammunition Demolition Activity (ADA) grounds, located along the western boundary of UMDA (see Plate 2 in map pocket of Baseline RA), are the most noteworthy of these areas.

The Explosive Washout Plant was active from the mid-1950s through the mid-1960s. The plant's operations, which took place in Building 489, included the removal of explosives from munitions, bombs, and projectiles by water or steam-cleaning techniques. Some of the residual effluent from this washout operation was ultimately discharged to one of two lagoons located to the west of the plant. The ADA grounds have been used since 1945 to store, detonate, and dispose of conventional munitions.

UMDA continues to be used to store containerized chemical agents, including agents GB, VX, and H; white phosphorus projectiles; missiles and propellants; and conventional munitions in onsite igloos. Munitions rework and demilitarization of conventional munitions are still performed, (e.g., defective or expired lots of demilitarized powder are routinely burned in the ADA area).

Demilitarization incinerators designed to destroy chemical agents may be constructed at UMDA in the future. The incinerators would be used to dispose of chemical agents currently stored at UMDA and possibly those stored at other Army

depots. UMDA is currently in the process of applying for a permit under RCRA to construct the incinerators and perform this operation.

Finally, under current provisions of the U.S. Department of Defense (DOD) Base Realignment and Closure Program, the Depot will be closed in the mid-1990s and the land made available for private sale and use. Barring any restrictions on use of the land following closure--which may be necessary--it could be developed for industrial, agricultural, recreational, or residential purposes.

2.2* RI/FS OPERABLE UNITS AND STUDY SITES

The RI/FS study sites are identified and briefly described below. Detailed site descriptions--including known history, observations from interpretation of historic aerial photography, and results of previous site investigations--are presented in Sections 4.0 through 13.0 of the RI. Other site areas that have been identified in the Resource Conservation and Recovery Act Facility Assessment (RFA) or through field reconnaissance, personnel interviews, or historic air photo interpretation--and are not included among the RI/FS study sites--are described in Appendix A of the Field Sampling Plan (FSP; Dames & Moore, 1990a) (along with reasons for noninclusion as RI/FS study sites). Furthermore, sites with existing or former underground storage tanks (UST) for petroleum fuels are not included among the RI/FS study sites (unless they have other potential problems not related to petroleum fuel USTs); such USTs are not covered under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and are, therefore, evaluated in a separate study program. This study, and any subsequent removal or remedial actions, will be conducted in accordance with Oregon Department of Environmental Quality (DEQ) rules. As the project progresses, additional sites may be identified (e.g., in the Enhanced Preliminary Assessment (PA) that has been conducted at UMDA (Dames & Moore, 1990b)) for inclusion among the RI/FS study sites.

The site numbering system used herein is consistent with that used in the RFA (Sites 1 through 33); numbers for additional sites begin where the RFA ended. Here and throughout the report, the sites and associated information are arranged into 10

groups in terms of operable units as shown below. An operable unit is defined by EPA as a "discrete action that comprises an incremental step toward comprehensively addressing site problems." This discrete portion of a remedial response manages migration, or eliminates or mitigates a release, threat of a release, or pathway of exposure. The cleanup of a site (i.e., an installation in the case of UMDA) can be divided into a number of operable units, depending on the complexity of the problems associated with the site. Operable units may address geographic portions of a site, specific site problems, or initial phases of an action, or may consist of any set of actions performed over time or any actions that are concurrent but located in different parts of the site (SS FR 8817). In this plan, operable units are mostly groups of sites that are geographically proximate and, therefore, may share common human exposure pathways, environmental impacts, and/or applicable remedial measures. In a few cases, study sites are included in an operable unit because they are associated with similar historical activities. The remainder of the sites, which do not fit into any particular category, are grouped together in an operable unit of miscellaneous sites. The first eight of the 10 operable units listed below are based on operable units defined in the Federal Facility Agreement (FFA) between the Army, EPA, and DEQ.

UMDA Operable Units

- Operable Unit A: Explosive Washout Lagoons (the National Priorities List (NPL) site) and Associated Buildings--six sites.
- Operable Unit B: Ammunition Demolition Activity (ADA) Area--20 sites.
- Operable Unit C: Inactive Landfills--three sites.
- Operable Unit D: Remote Munitions Disassembly Area.
- Operable Unit E: Deactivation Furnace and Southwestern Warehouse Area--11 sites.
- Operable Unit F: Sewage Treatment Plant and Vicinity--three sites.
- Operable Unit G: Active Landfill.

- Operable Unit H: Defense Re-utilization Marketing Office (DRMO) and Other Administration Area Sites--three sites.
- Operable Unit I: Chemical Agent/Agent Decontamination Solution Sites Outside of the ADA Area--three sites.
- Operable Unit J: Miscellaneous UMDA sites--seven sites.

All of the UMDA study sites are listed in Table 2-1* in the order in which they are discussed below and later in the report.

The location of each site is shown on one of the large plates (1, 2, or 3; in map pocket). Plate 1--a map of the entire Depot--shows all sites, with the exception of those in the ADA area and the administration area, which are shown on Plates 2 and 3, respectively. On Plate 1, UMDA is arbitrarily divided into areas as follows, to facilitate finding site locations:

Area	Description
I	ADA area (no sites shown; see Plate 2)
II	Southwest corner of UMDA
III	Midwest portion of UMDA with boundaries at north and south ends of the installation
IV	North-central portion of UMDA
V	Central portion of UMDA
VI	South-central portion of UMDA
VII	Eastern quarter of UMDA
VIII	Administration area (no sites shown; see Plate 3)

TABLE 2-1*

UMDA RI/FS Operable Units and Corresponding Study Sites

Operable Unit	Site No.	Site Name
A - Explosives Washout Lagoons and Associated Buildings	4	Explosive Washout Lagoons
	5	Explosive Washout Plant
	36	Building 493 Paint Sludge Discharge Area
	47	Boiler/Laundry Effluent Discharge Site
	52	Coyote Coulee Discharge Gullies
	67	Building 493 Brass Cleaning Operations Area
B - Ammunition Demolition Activity Area Sites	7	Aniline Pit
	8	Acid Pit
	13	Smoke Canister Disposal Area
	14	Flare and Fuse Disposal Area/Bird Cage Burn Area
	15	TNT Sludge Burial and Burn Area
	16	Open Detonation (OD) Pits
	17	Aboveground Open Detonation (OD) Area
	18	Dunnage Pits
	19	Open Burning Trenches/Pads
	21	Missile Fuel Storage Areas
	31	Pesticide Pits
	32	Open Burning Trays
	38	Pit Field Area
	41	GB/VX Decontamination Solution Burial Areas
	55	Trench/Burn Field
	56	Munitions Crate Burn Area
	57	Former Pit Area Locations
	58	Borrow/Burn/Disposal Area
	59	GB/VX Decontamination Solution Disposal Areas
	60	Active Firing Range
C - Inactive Landfills	12	Inactive Landfill
	50	Railroad Landfill Areas
	82	Former Gravel Pit/Disposal Location
D - Remote Munitions Disassembly Area	9	Remote Munitions Disassembly/GB Bomb Disassembly Area (TV Remote Site)

TABLE 2-1* (cont'd)

Operable Unit	Site No.	Site Name
E - Deactivation Furnace and Southwestern Warehouse Area	1	Deactivation Furnace
	3	Hazardous Waste Storage Facility
	25	Metal Ore Piles Location I
	26	Metal Ingots Stockpiles
	34	Paint Spray and Shot Blast Area
	35	Malathion Storage leak Area
	37	Building 131 Paint Sludge Discharge Area
	44	Road Oil Application/Disposal Sites Location I
	46	Railcar Unloading Area
	80	Disposal Pit and Graded Areas
	81	Former Raw Materials Storage Location I
F - Sewage Treatment Plant and Vicinity	6	Sewage Treatment Plant
	30	Stormwater Discharge Area
	48	Pipe Discharge Area
G - Active Landfill	11	Active Landfill
H - Defense Re-utilization Marketing Office (DRMO) and Other Administration Area Sites	22	DRMO Area
	27	Pesticide Storage Building
	44	Road Oil Application/Disposal Sites Location II
I - Chemical Agent/Agent Decontamination Sites Outside ADA	10	Former Agent H Storage Area
	33	Gravel Pit Disposal Area
	49	Drill and Transfer Site
J - Miscellaneous UMDA Sites	2	Storage Igloos
	25	Metal Ore Piles Location II
	29	Septic Tanks
	39	QA Function Range
	45	Building 612 and Building 617 Boiler Discharge Areas
	53	Building 433 Collection Sump/Cistern and Disposal Area
	81	Former Raw Materials Storage Location II

2.2.1* Operable Unit A: Explosive Washout Lagoons and Associated Buildings

These sites include the NPL site (Explosive Washout Lagoons) and the washout plant area along Coyote Coulee. Followup fieldwork sites in Operable Unit A are described below:

- Site 5, Explosive Washout Plant (Building 489) (Plate 1, Area V)--The washout plant was used to remove explosives from munitions, bombs, and projectiles by water or steam-cleaning techniques. Sludges containing the removed explosives that built up during plant operations were collected in prerinse and rinse tanks, transferred to a washout tank, and later reclaimed. The water remaining from the washout operations was discharged to one of two lagoons located to the west of the plant (i.e., Site 4). Former employees indicated that Building 489 was torn down in the 1950s and reconstructed at the same location. The processing equipment associated with the old building was reportedly sent to the ADA grounds, where explosive residues were burned prior to equipment disposal. Former UMDA employees had no recollection of any floor drains in the washout plant building. The employees indicated that the concrete floors of the building were occasionally steam-cleaned, and the resulting effluent was discharged into the two lagoons (i.e, Site 4) west of the plant.

- Site 36, Building 493 Paint Sludge Discharge Area (Plate 1, Area V)--Paint spray booths used in Building 493 near the Explosive Washout Plant reportedly discharged paint sludge, solvents, and possibly other wastes into the coulee northwest of the building via an underground drainage system. In addition, a brass cleaning solution containing cyanide was reportedly disposed of in this drainage system. Abundant paint stains were observed on soil near the two pipe discharge locations located along the coulee.

- Site 47, Boiler/Laundry Effluent Discharge Site (Plate I, Area V)--This site is located in the central portion of the Depot. To the south of the boiler plant building is a metal trough that was formerly used to discharge effluent during blowdown of the boilers. The laundering of clothes contaminated with explosives also took place in the boiler plant building, and effluent from the laundry operations was discharged to the metal trough. The trough discharged into a metal sump. From the metal trough, the effluent was discharged into a rock-lined pit approximately 25 feet in diameter and 8 to 10 feet deep.

2.2.2* Operable Unit B: Ammunition Demolition Activity (ADA) Area Sites

The ADA area, located on the western end of UMDA (see Plate 2 in map pocket), contains a number of sites that were previously, or are currently, used for specific ordnance disposal activities. In general, these areas were used to burn, detonate, or dispose of off-specification ordnance and other solid wastes generated at UMDA from 1945 to the present. Followup fieldwork sites in Operable Unit B are described below:

- Site 15, TNT Sludge Burial and Burn Area (Plate 2, north-central)--This area was used to dispose of or burn wastes that may have included TNT sludge, paint sludge, shot blast waste, and deactivation furnace ash. In addition, a scrap metal pile is located in the vicinity of the site. A prior sampling investigation detected heavy metals at approximately natural levels and high concentrations of some explosives in the surface soil.

- Site 17, Aboveground Open Detonation (OD) Area (Plate 2, central)--This site was used for the detonation of M55 rockets and M23 land mines. The munitions were detonated in a steel tube running through the center of a metal-filled gravel bin. Chemical agents from the M55 rocket canister were drained and collected as part of operations at the Drill and Transfer Site (Site 49) prior to detonation at Site 17.

- Site 18, Dunnage Pits (Plate 2, north-central)--Two Dunnage Pits, separated by a gravel road, are currently visible in the ADA area. They were used to burn or dispose of metals debris, waste solvents, waste oils, paint strippers, and other miscellaneous wastes. Interviews with UMDA retirees and aerial photos indicate that several former dunnage pits were once located farther east of the existing pits. An ash residue sample collected from one of the pits in 1981 was found to contain arsenic and chromium above the EP toxicity limits established under RCRA. Sampling of the surface soil in the eastern pit in 1988 did not detect any nitrite/nitrate, volatile organic analytes (VOAs), or priority pollutant base-neutral and acid extractable organics (BNAs).

- Site 19, Open Burning Trenches/Pads (Plate 2, north-central)--Approximately 10 burning trenches/pads and an adjoining burn field to the north are located in the north-central portion of the ADA grounds. Sludges containing explosives were reportedly burned in the northernmost trenches. The results of previous sampling at this site include the following--surface soil sampling at a burn pad revealed the presence of explosives; surface and subsurface sampling in a burn trench showed no contamination by explosives, nitrate, or BNAs; and an ash residue sample collected from this area was found to have low-level concentrations of explosives.

2.2.3* Operable Unit C: Inactive Landfills

Followup fieldwork sites in Operable Unit C are described below:

- Site 12, Inactive Landfills (Plate 1, Area VI)--Three landfills that have not been used for at least 15 years have been identified by UMDA to the west of the administration area. In addition, historic aerial photographs have revealed three other disposal areas, two to the south and southeast and one to the north. The materials disposed of in the landfills are suspected to be nonhazardous, though some former UMDA

employees indicated that explosives may have been disposed of. However, an analysis of groundwater in the site area by a previous investigation indicates the presence of only nitrite/nitrate as a significant contaminant at relatively high concentrations.

- Site 50, Railroad Landfill Areas (Plate 1, Area VI)--The Railroad Landfill Areas are located in the south-central portion of UMDA, approximately 500 feet south and southeast of the Sewage Treatment Plant. The site consists of two landfills--one located north of the railroad tracks, with dimensions of approximately 30 by 100 feet, and another located south of the railroad classification yard, with dimensions of 30 by 400 feet. The fill area to the south of the railroad yard is laterally discontinuous. Fill depths are unknown. Both of these landfills consist of topographic depressions formed when the railroad grade was installed and gradually filled in with debris. Based on field reconnaissance and observed rusted metal debris at the surface, disposal north of the railroad yard is limited to metal scrap materials. A former UMDA employee suggested that railroad cars may have been cleaned out and resulting debris disposed of at this location. The landfill south of the railroad tracks was described by a former UMDA employee as a "dry" landfill in which construction rubble was disposed. Abundant concrete fragments were visible in this area during the 1989 site visit.

2.2.5* Operable Unit E: Deactivation Furnace and Southwestern Warehouse Area

Followup fieldwork sites in Operable Unit E are described below:

- Site 26, Metal Ingot Stockpiles (Plate 1, Area II)--This site, located east of Building 200, consists of 6-foot-high piles of lead and zinc ingots. It occupies a total area of 30,000 to 40,000 square feet. The piles rest directly on gravelly soil. In addition, aluminum ingots were reportedly once stored in the southern part of the site.

2.2.6* Operable Unit F: Sewage Treatment Plant and Vicinity

Followup fieldwork sites in Operable Unit F are described below:

- Site 30, Stormwater Discharge Area (Plate 1, Area VI)--Stormwater collected in storm sewers located in the administration area discharges to a small ditch at this site. There was no evidence of any environmental degradation in this area during the 1989 site visit. Earlier reports incorrectly identified this discharge area at the location of the Sewage Treatment Plant tile field (Site 6), which is located several hundred feet to the northeast.

- Site 48, Pipe Discharge Area (Plate 1, Area VI)--Located in the south-central portion of the Depot is a pipe approximately 8 inches in diameter and 15 feet in length that discharges into a long ravine approximately 25 feet deep. A rusted 55-gallon drum was noted in the ravine during the 1989 Dames & Moore site visit. A sweet odor was reportedly detected near the drum, indicating the possible presence of pesticides. UMDA employees determined that this discharge pipe is connected to the large Imhoff tank associated with the Sewage Treatment Plant (Site 6) several hundred feet east of the site. Current UMDA employees indicate that this discharge area has not been used since the early 1970s.

2.2.7* Operable Unit G: Active Landfill (Site 11) (Plate 1, Area VII)

The Active Landfill has been used since 1968 to dispose of solid wastes generated at UMDA. The wastes include wood, garbage, building materials, dried sewage sludge, and empty pesticide containers. Contaminants detected in the groundwater near the landfill during the 1988 sampling by Weston included explosives, nitrite/nitrate, cyanide, and some metals, but--with the exception of nitrite/nitrate--they were at generally low concentrations.

2.2.8* Operable Unit H: Defense Re-utilization Marketing Office (DRMO) and Other Administration Area Sites

Followup fieldwork sites in Operable Unit H are described below:

- Site 22, Defense Re-utilization Marketing Office Area (Plate 3)--The DRMO Area is located in the southwest portion of the UMDA administration area. This site is used to store scrap and salvage materials, including metals, wooden crates, waste oils, and old transformers, as well as scrap metal, empty shells and cartridges, vehicles, furniture, etc. These materials are stored in a warehouse building or outside on a paved area or bare ground while awaiting sale or offsite disposal. A former UMDA employee reported that leaking transformers had been stored on bare ground in a shed at the site.

- Site 44, Road Oil Application/Disposal Sites Location II (Plate 3)--This part of Site 44 is located in the south-central portion of the Depot, to the south of the DRMO. Review of historic aerial photographs and interviews with former UMDA employees indicate that road oil was disposed of in this area from the mid 1950s through the mid 1960s to limit dust emissions. In addition, the southern portion of this area was used during the same period to transfer road oil from commercial supply trucks to Army supply vehicles. Furthermore, the eastern section of the area was used in the late 1940s to store drums of road oil and tar and to change the oil in Army vehicles. The waste oil was reportedly drained directly onto the soil. Presently, this area appears to be covered with a thin layer of macadam overlain with a thin soil cover. During the Dames & Moore site visit, there were some small areas where a tar-like substance was noted, and vegetation was growing through portions of the asphalt.

2.2.10* Operable Unit J: Miscellaneous UMDA Sites

These are sites that do not fit into any of the other operable units. Followup fieldwork sites in Operable Unit J are described below:

- Site 2, Storage Igloos (Plate 1, Areas III, IV, V, VI, and VII)--Earth-covered, reinforced-concrete igloos (1,001 total) for the storage of various munitions and wastes are located throughout UMDA. Wastes are stored in 55-gallon drums in J block and include chemical agents such as GB and VX. The igloos and associated drainage structures are inspected at regular intervals. Open storage areas are located between the igloos; these areas were periodically treated with a road oil/asphalt mixture to suppress dust.

3.0 DATA EVALUATION AND IDENTIFICATION OF CONTAMINANTS OF CONCERN

3.1* INTRODUCTION

Section 3.0 identifies the site- and medium-specific chemicals that are likely to be site-related and have reported concentrations of acceptable quality for use in the Baseline RA. The process by which potential contaminants of concern are identified--including comparison with method blanks, comparison with background samples, and evaluation of tentatively identified compounds (TICs)--is described in the Baseline RA and is not repeated in this addendum.

The nature and extent of contamination at each of the 16 sites included in this RA addendum are presented and evaluated in the RI addendum and are not repeated herein. Data evaluated in this addendum are Weston data collected during the 1988 RI, Dames & Moore data collected in 1990 and 1991, and Dames & Moore followup field investigation data from 1992 and 1993. Data collected during other investigations (e.g., Battelle) are not considered, because they are over 10 years old, sample locations are often not reported, and QA/QC procedures are questionable.

The reasons for excluding some data (e.g., toxicity characteristic leaching procedure (TCLP), oil and grease, total petroleum hydrocarbon (TPHC), and pH analyses) collected during the Weston and Dames & Moore investigations are discussed in Section 3.1 of the Baseline RA and are not repeated herein.

To assist in the selection of contaminants of concern for each followup fieldwork site, data are summarized in occurrence and distribution tables for each site and for each medium. These tables present the detected analytes, frequency of detection, percent positive detections, range of sample detection limits, range of detected concentrations, 95 percent upper confidence limit (UCL) on the arithmetic mean, location of maximum concentration, comparison concentrations (background levels), criteria type, and number of exceedances. Where collected, soil samples are separated into two occurrence and distribution tables--results for sample depths from

0 to 2 feet (to evaluate exposure pathways involving surface soil as the medium of concern) and results for sample depths from 0 to 10 feet (to evaluate exposure pathways involving both surface and subsurface soil as the media of concern). Contaminants of concern are selected independently for each depth interval. Soil samples from depths exceeding 10 feet are not expected to be transported or contacted by receptors under either current or future land uses; therefore, these results are not included in the occurrence and distribution tables, and contaminants of concern are not selected for soil greater than 10 feet in depth.

The occurrence and distribution tables for the followup fieldwork sites are presented in the following sections. Accompanying text provides the site-by-site rationale for including certain chemicals as contaminants of concern and excluding others. The groundwater and soil contaminants of concern for each of the 68 UMDA sites are listed in Tables 3-2* and 3-3*, respectively. Only analytes that were detected in at least one sample are included (i.e., if an analyte was not detected in any sample from that medium, even though it was analyzed for, it does not appear in the table). TICs are not presented unless they are selected as contaminants of concern. The coding system used in Tables 3-2* and 3-3* is described in Section 3.1 of the Baseline RA.

Followup fieldwork results did not alter the contaminants of concern for groundwater at Sites 11, 19, and 50--the only three sites at which additional groundwater sampling was conducted during followup fieldwork.

Additional shallow soil contaminants of concern identified based on followup fieldwork results are as follows:

<u>Operable Unit A:</u>

- Site 5: Tetryl (not detected during the RI).
- Site 36: No additional contaminants of concern.
- Site 47: Dieldrin (not detected during the RI).

TABLE 3-2*

Summary of Contaminants of Concern Selected for Groundwater at UMDA

Chemicals	Operable Unit A: 4, 47, and 67 Fld. Gr.	Operable Unit A: 4, 47, and 67 Basalt	Operable Unit B: 8 and 31	13 and 57 (Loc. II)	14 and 38	15 and 55	16	18	19**	41	57 (Loc. I)	57 (Loc. III)	59	Operable Unit C: 12	50**	Operable Unit G: 11**
TAL Inorganics																
Antimony	■	■	■	■	■	■	ND	ND	■	■	■	■	NA	■	ND	■
Arsenic	■	ND	■	■	■	■	■	■	■	■	■	■	NA	■	■	■
Barium	BKGD	BKGD	■	■	■	■	■	■	BKGD	■	■	■	NA	BKGD	BKGD	■
Beryllium	■	ND	ND	ND	ND	ND	ND	ND	■	■	ND	ND	NA	ND	ND	ND
Calcium	BKGD	BKGD	BKGD	BKGD	BKGD	BKGD	BKGD	BKGD	BKGD	BKGD	BKGD	BKGD	NA	BKGD	BKGD	BKGD
Chromium	■	ND	ND	ND	■	ND	■	ND	ND	■	■	ND	NA	ND	ND	■
Copper	■	ND	■	ND	ND	ND	ND	ND	■	■	■	ND	NA	■	■	■
Iron	ND	BKGD	ND	ND	ND	ND	ND	ND	ND	ND	ND	BKGD	NA	BKGD	ND	BKGD
Lead	■	BKGD	BKGD	BKGD	BKGD	ND	■	BKGD	■	■	BKGD	BKGD	NA	■	BKGD	■
Magnesium	BKGD	BKGD	BKGD	BKGD	BKGD	BKGD	BKGD	BKGD	BKGD	BKGD	BKGD	BKGD	NA	BKGD	BKGD	BKGD
Manganese	BKGD	BKGD	BKGD	BKGD	BKGD	■	BKGD	■	BKGD	■	■	BKGD	NA	BKGD	ND	BKGD
Mercury	BKGD	ND	■	ND	BKGD	ND	BKGD	ND	ND	ND	ND	■	NA	BKGD	ND	ND
Nickel	■	ND	ND	ND	ND	ND	ND	ND	■	■	ND	ND	NA	■	■	ND
Potassium	BKGD	BKGD	BKGD	BKGD	BKGD	BKGD	BKGD	BKGD	BKGD	BKGD	BKGD	BKGD	NA	BKGD	BKGD	BKGD
Silver	BKGD	ND	ND	ND	ND	ND	ND	ND	BKGD	BKGD	ND	ND	NA	ND	ND	ND
Sodium	■	BKGD	BKGD	BKGD	BKGD	BKGD	BKGD	BKGD	BKGD	BKGD	BKGD	BKGD	NA	BKGD	BKGD	BKGD
Vanadium	■	ND	■	■	■	ND	■	■	■	■	■	■	NA	■	■	■
Zinc	■	BKGD	■	ND	ND	■	ND	ND	BKGD	■	■	ND	NA	■	■	■
Cyanide	ND	ND	ND	ND	ND	ND	ND	ND	NA	ND	ND	ND	NA	■	■	■
Selenium	ND	ND	ND	■	■	ND	■	ND	■	ND	ND	ND	NA	ND	ND	■
Explosives																
1,3,5-Trinitrobenzene	■	■	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA	ND	ND	ND
1,3-Dinitrobenzene	■	■	ND	ND	ND	ND	ND	ND	■	ND	ND	ND	NA	ND	ND	ND
2,4,6-TNT	■	■	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA	ND	ND	ND
2,4-DNT	■	■	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA	ND	ND	■
2,6-DNT	■	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA	ND	ND	■
HMX	■	■	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA	ND	ND	ND
RDX	■	■	■	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA	■	■	■
Nitrobenzene	■	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA	ND	ND	ND
Tetryl	■	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA	■	ND	■
Other Inorganics																
Nitrate/nitrite	■	BKGD	■	BKGD	BKGD	BKGD	BKGD	BKGD	BKGD	BKGD	BKGD	BKGD	NA	BKGD	BKGD	BKGD
Chloride	BKGD	BKGD	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sulfate	BKGD	BKGD	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TCL Volatiles																
Chloroform	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA	ND	ND	BLK
Trichlorofluoromethane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA	BLK	BLK	BLK
Toluene	BLK	ND	BLK	BLK	ND	ND	ND	ND	BLK	ND	ND	ND	NA	ND	ND	BLK
Benzene	ND	ND	■	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA	ND	ND	ND
Trichloroethylene	■	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA	ND	ND	ND
TCL Semivolatiles																
Bis(2-ethylhexyl)phthalate	ND	ND	BLK	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA	ND	ND	BLK

"Fld. Gr." - Flood gravel aquifer
"ND" - Not Detected

"NA" - Not Analyzed
"BKGD" - Detected but not selected because concentrations were within background levels.
"BLK" - Detected but not selected because chemical is commonly detected in laboratory blanks; see text for further explanation.

■ - Selected as a contaminant of concern.
* - Replaces original Table 3-2 in the Final Baseline RA; Dames & Moore, 1992a.
** - Site at which followup fieldwork groundwater sampling was conducted.

TABLE 3-3*

Summary of Contaminants of Concern Selected for Soil at UMDA

Chemicals	Operable Unit A 4 (a)	4 (b)	5** (a)	5** (b)	36** (a)	47** (a)	47** (b)	52 (a)	67 (a)	67 (b)	Operable Unit B 7 (b)	8 (b)	13 (a)	13 (b)	14 (a)
TAL Inorganics															
Aluminum	NA	NA	NA	NA	BKGD	BKGD	BKGD	BKGD	BKGD	BKGD	BKGD	NA	BKGD	■	BKGD
Antimony	NA	NA	NA	NA	ND	■	■	ND	ND	ND	ND	ND	■	■	ND
Arsenic	NA	NA	NA	NA	BKGD	BKGD	BKGD	BKGD	BKGD	BKGD	BKGD	ND	■	■	BKGD
Barium	NA	NA	NA	NA	BKGD	■	■	BKGD	BKGD	BKGD	BKGD	NA	BKGD	BKGD	■
Beryllium	NA	NA	NA	NA	BKGD	BKGD	BKGD	ND	ND	ND	ND	ND	ND	ND	ND
Cadmium	NA	NA	NA	NA	■	■	■	ND	ND	ND	ND	ND	ND	ND	ND
Calcium	NA	NA	NA	NA	BKGD	■	■	BKGD	BKGD	BKGD	BKGD	NA	BKGD	BKGD	BKGD
Chromium	NA	NA	NA	NA	■	■	■	ND	ND	ND	ND	BKGD	ND	ND	■
Cobalt	NA	NA	NA	NA	■	BKGD	BKGD	ND	ND	ND	ND	NA	ND	ND	ND
Copper	NA	NA	NA	NA	■	■	■	■	ND	ND	ND	BKGD	■	■	ND
Iron	NA	NA	NA	NA	■	BKGD	BKGD	BKGD	BKGD	BKGD	BKGD	NA	■	■	BKGD
Lead	NA	NA	NA	NA	■	■	■	■	■	■	BKGD	■	■	■	■
Magnesium	NA	NA	NA	NA	BKGD	■	■	BKGD	BKGD	BKGD	BKGD	NA	BKGD	■	BKGD
Manganese	NA	NA	NA	NA	BKGD	BKGD	BKGD	BKGD	BKGD	BKGD	BKGD	NA	■	■	BKGD
Mercury	NA	NA	NA	NA	ND	■	■	ND	ND	ND	ND	ND	■	■	ND
Nickel	NA	NA	NA	NA	■	■	■	ND	ND	ND	ND	■	■	■	ND
Potassium	NA	NA	NA	NA	BKGD	BKGD	BKGD	BKGD	BKGD	BKGD	BKGD	NA	BKGD	■	■
Selenium	NA	NA	NA	NA	ND	■	■	ND	ND	ND	ND	ND	ND	ND	ND
Silver	NA	NA	NA	NA	■	■	■	BKGD	BKGD	■	ND	ND	■	■	■
Sodium	NA	NA	NA	NA	BKGD	■	■	BKGD	BKGD	BKGD	BKGD	NA	BKGD	BKGD	BKGD
Thallium	NA	NA	NA	NA	ND	BKGD	BKGD	ND	ND	ND	ND	ND	ND	ND	ND
Vanadium	NA	NA	NA	NA	BKGD	BKGD	BKGD	BKGD	BKGD	BKGD	BKGD	NA	BKGD	BKGD	BKGD
Zinc	NA	NA	NA	NA	■	■	■	■	BKGD	BKGD	BKGD	■	■	■	■
Cyanide	NA	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Explosives															
1,3,5-Trinitrobenzene	■	■	■	■	ND	ND	ND	ND	NA	NA	NA	NA	ND	ND	ND
1,3-Dinitrobenzene	ND	■	■	■	ND	ND	ND	ND	NA	NA	NA	NA	ND	ND	ND
2,4,6-TNT	■	■	■	■	ND	ND	ND	ND	NA	NA	NA	NA	ND	ND	ND
2,4-DNT	■	■	■	■	ND	ND	ND	ND	NA	NA	NA	NA	ND	ND	ND
2,6-DNT	ND	ND	ND	ND	ND	ND	ND	ND	NA	NA	NA	NA	■	■	ND
HMX	■	■	■	■	ND	ND	ND	■	NA	NA	NA	NA	ND	ND	ND
RDX	■	■	■	■	ND	ND	ND	■	NA	NA	NA	NA	ND	ND	ND
Nitrobenzene	ND	■	ND	ND	ND	ND	ND	ND	NA	NA	ND	NA	ND	ND	ND
Tetryl	ND	ND	■	■	ND	ND	ND	ND	NA	NA	NA	NA	ND	ND	ND
Other Inorganics															
Nitrate/nitrite	■	■	■	■	■	■	■	BKGD	NA	NA	NA	ND	BKGD	BKGD	BKGD
TCL Volatiles															
Acetone	NA	NA	NA	NA	ND	BLK	BLK	ND	NA	NA	ND	BLK	NA	ND	NA
Chloroform	NA	NA	NA	NA	ND	ND	ND	ND	NA	NA	ND	BLK	NA	ND	NA
Ethylbenzene	NA	NA	NA	NA	ND	ND	ND	ND	NA	NA	ND	ND	NA	ND	NA
Tetrachloroethylene	NA	NA	NA	NA	ND	ND	ND	ND	NA	NA	ND	ND	NA	ND	NA
Toluene	NA	NA	NA	NA	ND	ND	ND	ND	NA	NA	ND	BLK	NA	ND	NA
1,1,1-Trichloroethane	NA	NA	NA	NA	ND	ND	ND	ND	NA	NA	ND	ND	NA	ND	NA
Trichloroethylene	NA	NA	NA	NA	ND	ND	ND	ND	NA	NA	ND	ND	NA	ND	NA
Trichlorofluoromethane	NA	NA	NA	NA	BLK	BLK	BLK	ND	NA	NA	ND	ND	NA	ND	NA
Xylenes	NA	NA	NA	NA	ND	ND	ND	ND	NA	NA	ND	ND	NA	ND	NA
TCL Semivolatiles															
Anthracene	NA	NA	NA	NA	ND	ND	ND	ND	NA	NA	ND	ND	NA	ND	NA
Benzo(a)anthracene	NA	NA	NA	NA	ND	■	■	ND	NA	NA	ND	ND	NA	ND	NA
Benzo(a)pyrene	NA	NA	NA	NA	ND	ND	ND	ND	NA	NA	ND	ND	NA	ND	NA
Benzo(b)fluoranthene	NA	NA	NA	NA	ND	■	■	ND	NA	NA	ND	ND	NA	ND	NA
Benzo(ghi)perylene	NA	NA	NA	NA	ND	ND	ND	ND	NA	NA	ND	ND	NA	ND	NA
Benzo(k)fluoranthene	NA	NA	NA	NA	ND	■	■	ND	NA	NA	ND	ND	NA	ND	NA
Bis(2-ethylhexyl)phthalate	NA	NA	NA	NA	BLK	ND	ND	ND	NA	NA	ND	ND	NA	ND	NA
Chrysene	NA	NA	NA	NA	ND	■	■	ND	NA	NA	ND	ND	NA	ND	NA
Dibenzofuran	NA	NA	NA	NA	ND	ND	ND	ND	NA	NA	ND	ND	NA	ND	NA
Di-n-butyl phthalate	NA	NA	NA	NA	ND	■	■	ND	NA	NA	ND	ND	NA	ND	NA
Fluoranthene	NA	NA	NA	NA	ND	■	■	ND	NA	NA	ND	ND	NA	ND	NA
Indeno(1,2,3-cd)pyrene	NA	NA	NA	NA	ND	ND	ND	ND	NA	NA	ND	ND	NA	ND	NA
2-Methylnapthalene	NA	NA	NA	NA	ND	ND	ND	ND	NA	NA	ND	ND	NA	ND	NA
Naphthalene	NA	NA	NA	NA	ND	ND	ND	ND	NA	NA	ND	ND	NA	ND	NA
N-nitrosodiphenylamine	NA	NA	NA	NA	ND	ND	ND	ND	NA	NA	ND	ND	NA	ND	NA
Phenanthrene	NA	NA	NA	NA	ND	■	■	ND	NA	NA	ND	ND	NA	ND	NA
Pyrene	NA	NA	NA	NA	ND	■	■	ND	NA	NA	ND	ND	NA	ND	NA
Pesticides/PCBs															
Chlordane	NA	NA	NA	NA	NA	■	■	NA	NA	NA	NA	ND	NA	NA	NA
Dieldrin	NA	NA	NA	NA	NA	■	■	NA	NA	NA	NA	ND	NA	NA	NA
DDD	NA	NA	NA	NA	NA	■	■	NA	NA	NA	NA	ND	NA	NA	NA
DDE	NA	NA	NA	NA	NA	■	■	NA	NA	NA	NA	ND	NA	NA	NA
DDT	NA	NA	NA	NA	NA	■	■	NA	NA	NA	NA	ND	NA	NA	NA
Endrin	NA	NA	NA	NA	NA	ND	ND	NA	NA	NA	NA	ND	NA	NA	NA
PCB-1260	NA	NA	NA	NA	NA	■	■	NA	NA	NA	NA	ND	NA	NA	NA
Chem. Agt Breakdown Prod.															
EMPA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
IMPA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Thiodiglycol	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

(a) - Soil to a depth of 2 feet.

(b) - Soil to a depth of 10 feet.

"NA" - Not Analyzed

"ND" - Not Detected

■ - Selected as a contaminant of concern.

"BKGD" - Detected but not selected because concentrations were within background levels.

"BLK" - Detected but not selected because contaminant is a common laboratory blank; see text for further explanation.

* - Replaces original Table 3-3 in the *Final Baseline RA*; Dames & Moore, 1992a.

** - Site at which followup fieldwork was performed on soil.

TABLE 3-3* (cont'd)

Summary of Contaminants of Concern Selected for Soil at UMDA

Chemicals	Operable Unit B (cont'd)														
	14 (b)	15** (a)	15** (b)	16 (a)	16 (b)	17** (a)	18** (a)	18** (b)	19** (a)	19** (b)	21 (a)	21 (b)	31 (a)	31 (b)	32 Loc. I (a)
TAL Inorganics															
Aluminum	BKGD	BKGD	■	BKGD	■	BKGD	■	■	■	■	BKGD	BKGD	BKGD	■	BKGD
Antimony	ND	■	■	ND	ND	■	ND	■	■	■	ND	ND	ND	ND	ND
Arsenic	BKGD	■	■	BKGD	■	BKGD	■	■	■	■	BKGD	BKGD	BKGD	■	BKGD
Barium	■	■	■	■	■	BKGD	■	■	■	■	BKGD	BKGD	■	■	BKGD
Beryllium	ND	■	■	ND	ND	■	BKGD	■	BKGD	BKGD	ND	ND	ND	ND	ND
Cadmium	ND	■	■	■	■	■	BKGD	■	■	■	ND	ND	ND	ND	ND
Calcium	BKGD	BKGD	■	BKGD	■	BKGD	BKGD	BKGD	BKGD	■	BKGD	BKGD	BKGD	■	BKGD
Chromium	■	■	■	ND	BKGD	BKGD	■	■	■	■	ND	ND	ND	■	ND
Cobalt	ND	■	■	■	■	■	BKGD	BKGD	BKGD	BKGD	ND	ND	ND	ND	ND
Copper	ND	■	■	■	■	■	■	■	■	■	ND	ND	ND	■	■
Iron	BKGD	■	■	BKGD	■	■	BKGD	■	BKGD	BKGD	BKGD	BKGD	■	■	BKGD
Lead	■	■	■	BKGD	■	■	■	■	■	■	BKGD	■	■	■	■
Magnesium	BKGD	■	■	BKGD	■	BKGD	BKGD	■	BKGD	■	BKGD	BKGD	BKGD	■	BKGD
Manganese	BKGD	■	■	BKGD	BKGD	BKGD	■	■	BKGD	BKGD	BKGD	BKGD	BKGD	BKGD	BKGD
Mercury	ND	■	■	ND	■	■	ND	ND	■	■	ND	ND	ND	■	BKGD
Nickel	ND	■	■	ND	ND	■	■	■	■	■	ND	ND	ND	■	ND
Potassium	■	■	■	BKGD	■	BKGD	BKGD	■	■	■	BKGD	BKGD	■	■	■
Selenium	ND	■	■	ND	ND	ND	ND	■	ND	ND	ND	ND	ND	ND	ND
Silver	■	■	■	■	■	■	■	■	■	■	ND	BKGD	■	■	■
Sodium	BKGD	■	■	BKGD	■	BKGD	■	■	■	■	BKGD	BKGD	■	■	BKGD
Thallium	ND	■	■	ND	ND	ND	BKGD	BKGD	BKGD	BKGD	ND	ND	ND	ND	ND
Vanadium	BKGD	BKGD	■	BKGD	BKGD	BKGD	BKGD	■	BKGD	BKGD	BKGD	BKGD	BKGD	BKGD	BKGD
Zinc	■	■	■	BKGD	■	■	■	■	■	■	ND	BKGD	■	■	■
Cyanide	ND	ND	ND	■	■	NA	ND	ND	NA	NA	ND	ND	ND	ND	NA
Explosives															
1,3,5-Trinitrobenzene	ND	■	■	ND	■	ND	ND	ND	■	■	ND	ND	■	■	ND
1,3-Dinitrobenzene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
2,4,6-TNT	ND	■	■	■	■	■	ND	ND	■	■	ND	ND	■	■	ND
2,4-DNT	ND	■	■	ND	■	ND	ND	ND	ND	■	ND	ND	■	■	■
2,6-DNT	ND	■	■	ND	ND	ND	ND	ND	ND	■	ND	ND	■	■	ND
HMX	ND	■	■	ND	■	■	ND	ND	ND	■	ND	ND	ND	ND	ND
RDX	ND	■	■	■	■	■	ND	ND	ND	■	ND	ND	■	■	ND
Nitrobenzene	ND	ND	ND	ND	■	ND	ND	ND	■	■	ND	ND	ND	ND	ND
Tetryl	ND	ND	ND	ND	ND	ND	ND	ND	■	■	ND	ND	■	■	ND
Other Inorganics															
Nitrate/nitrite	■	■	■	■	■	BKGD	BKGD	BKGD	■	■	■	■	■	■	■
TCL Volatiles															
Acetone	ND	BLK	BLK	NA	BKGD	NA	BLK	BLK	NA	BLK	BLK	BLK	ND	BLK	ND
Chloroform	ND	ND	ND	NA	ND	NA	ND	ND	NA	ND	ND	ND	ND	ND	ND
Ethylbenzene	ND	ND	ND	NA	ND	NA	ND	ND	NA	ND	ND	ND	ND	ND	ND
Tetrachloroethylene	ND	ND	ND	NA	ND	NA	ND	ND	NA	■	ND	ND	ND	ND	ND
Toluene	ND	ND	BLK	NA	ND	NA	ND	BLK	NA	BLK	ND	ND	ND	ND	ND
1,1,1-Trichloroethane	ND	ND	ND	NA	ND	NA	■	■	NA	ND	ND	ND	ND	ND	ND
Trichloroethylene	ND	ND	■	NA	ND	NA	ND	ND	NA	■	ND	ND	ND	■	ND
Trichlorofluoromethane	BLK	BLK	BLK	NA	ND	NA	BLK	BLK	NA	BLK	ND	ND	BLK	BLK	BLK
Xylenes	ND	ND	ND	NA	ND	NA	ND	ND	NA	ND	ND	ND	ND	■	ND
TCL Semivolatiles															
Anthracene	ND	ND	ND	NA	ND	NA	ND	ND	NA	ND	ND	ND	ND	ND	NA
Benzo(a)anthracene	ND	ND	ND	NA	ND	NA	ND	ND	NA	ND	ND	ND	ND	ND	NA
Benzo(a)pyrene	ND	ND	ND	NA	ND	NA	ND	ND	NA	ND	ND	ND	ND	ND	NA
Benzo(b)fluoranthene	ND	ND	ND	NA	ND	NA	ND	ND	NA	ND	ND	ND	ND	ND	NA
Benzo(ghi)perylene	ND	ND	ND	NA	ND	NA	ND	ND	NA	ND	ND	ND	ND	ND	NA
Benzo(k)fluoranthene	ND	ND	ND	NA	ND	NA	ND	ND	NA	ND	ND	ND	ND	ND	NA
Bis(2-ethylhexyl)phthalate	ND	BLK	■	NA	ND	NA	ND	ND	NA	ND	ND	ND	ND	ND	NA
Chrysene	ND	ND	ND	NA	ND	NA	ND	ND	NA	ND	ND	ND	ND	ND	NA
Dibenzofuran	ND	ND	ND	NA	ND	NA	ND	ND	NA	ND	ND	ND	ND	ND	NA
Di-n-butyl phthalate	ND	ND	ND	NA	ND	NA	■	■	NA	ND	ND	ND	ND	ND	NA
Fluoranthene	ND	ND	ND	NA	ND	NA	ND	ND	NA	ND	ND	ND	ND	ND	NA
Indeno(1,2,3-cd)pyrene	ND	ND	ND	NA	ND	NA	ND	ND	NA	ND	ND	ND	ND	ND	NA
2-Methylnapthalene	ND	ND	ND	NA	ND	NA	ND	ND	NA	ND	ND	ND	ND	■	NA
Naphthalene	ND	ND	■	NA	ND	NA	ND	■	NA	ND	ND	ND	■	■	NA
N-nitrosodiphenylamine	ND	ND	ND	NA	ND	NA	ND	ND	NA	ND	ND	ND	ND	ND	NA
Phenanthrene	ND	ND	■	NA	ND	NA	■	■	NA	ND	ND	ND	■	■	NA
Pyrene	ND	ND	ND	NA	ND	NA	ND	ND	NA	ND	ND	ND	ND	ND	NA
Pesticides/PCBs															
Chlordane	NA	NA	NA	NA	NA	NA	ND	ND	NA	NA	ND	ND	ND	ND	NA
Dieldrin	NA	NA	NA	NA	NA	NA	ND	■	NA	NA	ND	ND	■	■	NA
DDD	NA	NA	NA	NA	NA	NA	ND	ND	NA	NA	ND	ND	■	■	NA
DDE	NA	NA	NA	NA	NA	NA	■	■	NA	NA	ND	ND	■	■	NA
DDT	NA	NA	NA	NA	NA	NA	■	■	NA	NA	ND	ND	■	■	NA
Endrin	NA	NA	NA	NA	NA	NA	ND	ND	NA	NA	ND	ND	ND	■	NA
PCB-1260	NA	NA	NA	NA	NA	NA	ND	■	NA	NA	ND	ND	ND	ND	NA
Chem. Agt Breakdown Prod.															
EMPA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
IMPA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Thiodiglycol	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

(a) - Soil to a depth of 2 feet.
(b) - Soil to a depth of 10 feet.
"NA" - Not Analyzed
"ND" - Not Detected
■ - Selected as a contaminant of concern.
"BKGD" - Detected but not selected because concentrations were within background levels.
"BLK" - Detected but not selected because contaminant is a common laboratory blank; see text for further explanation.
* - Replaces original Table 3-3 in the Final Baseline RA; Dames & Moore, 1992a.
** - Site at which followup fieldwork was conducted on soil.

TABLE 3-3* (cont'd)

Summary of Contaminants of Concern Selected for Soil at UMDA

Operable Unit B (cont'd)

Chemicals	32 Loc. II (a)	38 (a)	38 (b)	41 (a)	41 (b)	55 (b)	58 (a)	58 (b)	57 Loc. I (a)	57 Loc. I (b)	57 Loc. II (a)	57 Loc. II (b)	57 Loc. III (a)	57 Loc. III (b)
TAL Inorganics														
Aluminum	■	BKGD	■	BKGD	BKGD	BKGD	BKGD	■	BKGD	BKGD	BKGD	BKGD	BKGD	BKGD
Antimony	■	ND	ND	■	■	ND	ND	ND	ND	ND	ND	ND	ND	ND
Arsenic	BKGD	BKGD	■	BKGD	BKGD	■	ND	ND	BKGD	BKGD	BKGD	BKGD	■	■
Barium	■	BKGD	■	BKGD	BKGD	BKGD	BKGD	BKGD	BKGD	BKGD	BKGD	BKGD	BKGD	BKGD
Beryllium	ND	ND	ND	ND	ND	ND	■	■	ND	ND	ND	ND	ND	BKGD
Cadmium	ND	■	■	ND	ND	ND	ND	ND	ND	ND	ND	ND	■	■
Calcium	BKGD	BKGD	■	BKGD	BKGD	BKGD	■	■	BKGD	■	BKGD	BKGD	BKGD	■
Chromium	ND	BKGD	BKGD	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Cobalt	ND	ND	BKGD	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Copper	■	■	■	ND	ND	ND	ND	ND	ND	ND	■	■	■	■
Iron	BKGD	■	■	BKGD	BKGD	BKGD	BKGD	BKGD	BKGD	BKGD	BKGD	BKGD	BKGD	BKGD
Lead	■	■	■	■	■	BKGD	■	■	■	■	■	■	■	■
Magnesium	■	BKGD	■	BKGD	BKGD	BKGD	BKGD	■	BKGD	■	BKGD	■	BKGD	■
Manganese	BKGD	BKGD	BKGD	BKGD	BKGD	BKGD	BKGD	BKGD	BKGD	BKGD	BKGD	BKGD	BKGD	BKGD
Mercury	ND	■	■	ND	ND	ND	ND	ND	■	■	■	■	■	■
Nickel	ND	■	■	ND	ND	ND	ND	ND	ND	ND	■	■	ND	ND
Potassium	■	■	■	BKGD	BKGD	BKGD	BKGD	■	■	■	■	■	■	■
Selenium	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Silver	■	■	■	BKGD	BKGD	■	ND	ND	ND	ND	■	■	■	■
Sodium	BKGD	BKGD	■	BKGD	BKGD	BKGD	BKGD	BKGD	BKGD	BKGD	BKGD	BKGD	BKGD	BKGD
Thallium	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Vanadium	BKGD	BKGD	BKGD	BKGD	BKGD	BKGD	BKGD	BKGD	BKGD	BKGD	BKGD	BKGD	BKGD	BKGD
Zinc	■	■	■	BKGD	■	BKGD	BKGD	BKGD	■	■	■	■	■	■
Cyanide	NA	ND	■	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Explosives														
1,3,5-Trinitrobenzene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,3-Dinitrobenzene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
2,4,6-TNT	ND	■	■	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	■
2,4-DNT	■	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
2,6-DNT	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
HMX	ND	ND	ND	ND	ND	■	ND	ND	ND	ND	ND	ND	ND	ND
RDX	ND	ND	ND	ND	ND	■	ND	ND	ND	ND	ND	ND	ND	ND
Nitrobenzene	ND	ND	■	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Tetryl	ND	ND	■	ND	ND	ND	ND	ND	ND	ND	■	■	ND	ND
Other Inorganics														
Nitrate/nitrite	■	BKGD	BKGD	BKGD	BKGD	BKGD	ND	ND	BKGD	BKGD	BKGD	■	BKGD	BKGD
TCL Volatiles														
Acetone	ND	NA	BLK	BLK	ND	ND	ND	ND	NA	ND	NA	ND	NA	ND
Chloroform	ND	NA	ND	BLK	BLK	ND	ND	ND	NA	ND	NA	ND	NA	ND
Ethylbenzene	ND	NA	ND	ND	ND	ND	ND	ND	NA	ND	NA	ND	NA	ND
Tetrachloroethylene	ND	NA	ND	ND	ND	ND	ND	ND	NA	ND	NA	ND	NA	ND
Toluene	ND	NA	ND	BLK	ND	ND	ND	ND	NA	ND	NA	ND	NA	ND
1,1,1-Trichloroethane	ND	NA	ND	ND	■	ND	ND	ND	NA	ND	NA	ND	NA	ND
Trichloroethylene	ND	NA	ND	ND	ND	ND	ND	ND	NA	■	NA	ND	NA	ND
Trichlorofluoromethane	BLK	NA	BLK	BLK	BLK	BLK	BLK	BLK	NA	BLK	NA	BLK	NA	BLK
Xylenes	ND	NA	ND	ND	ND	ND	ND	ND	NA	ND	NA	ND	NA	ND
TCL Semivolatiles														
Anthracene	NA	NA	ND	ND	ND	ND	ND	ND	NA	ND	NA	ND	NA	ND
Benzo(a)anthracene	NA	NA	ND	ND	ND	ND	ND	ND	NA	ND	NA	ND	NA	ND
Benzo(a)pyrene	NA	NA	ND	ND	ND	ND	ND	ND	NA	ND	NA	ND	NA	ND
Benzo(b)fluoranthene	NA	NA	ND	ND	ND	ND	ND	ND	NA	ND	NA	ND	NA	ND
Benzo(ghi)perylene	NA	NA	ND	ND	ND	ND	ND	ND	NA	ND	NA	ND	NA	ND
Benzo(k)fluoranthene	NA	NA	ND	ND	ND	ND	ND	ND	NA	ND	NA	ND	NA	ND
Bis(2-ethylhexyl)phthalate	NA	NA	ND	ND	ND	ND	ND	ND	NA	ND	NA	ND	NA	ND
Chrysene	NA	NA	ND	ND	ND	ND	ND	ND	NA	ND	NA	ND	NA	ND
Dibenzofuran	NA	NA	ND	ND	ND	ND	ND	ND	NA	ND	NA	ND	NA	ND
Di-n-butyl phthalate	NA	NA	ND	■	■	ND	ND	ND	NA	ND	NA	ND	NA	ND
Fluoranthene	NA	NA	ND	ND	ND	ND	ND	ND	NA	ND	NA	ND	NA	ND
Indeno(1,2,3-cd)pyrene	NA	NA	ND	ND	ND	ND	ND	ND	NA	ND	NA	ND	NA	ND
2-Methylnapthalene	NA	NA	ND	ND	ND	ND	ND	ND	NA	ND	NA	ND	NA	ND
Naphthalene	NA	NA	ND	ND	ND	ND	ND	ND	NA	ND	NA	ND	NA	ND
N-nitrosodiphenylamine	NA	NA	ND	ND	ND	ND	ND	ND	NA	ND	NA	ND	NA	ND
Phenanthrene	NA	NA	ND	ND	ND	ND	ND	ND	NA	ND	NA	ND	NA	ND
Pyrene	NA	NA	ND	ND	ND	ND	ND	ND	NA	ND	NA	ND	NA	ND
Pesticides/PCBs														
Chlordane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dieldrin	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DDD	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DDE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DDT	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Endrin	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
PCB-1260	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chem. Agt Breakdown Prod.														
EMPA	NA	NA	NA	ND	ND	NA	NA	NA	NA	NA	NA	NA	NA	NA
IMPA	NA	NA	NA	ND	ND	NA	NA	NA	NA	NA	NA	NA	NA	NA
Thiodiglycol	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

(a) - Soil to a depth of 2 feet.
(b) - Soil to a depth of 10 feet.
"NA" - Not Analyzed
"ND" - Not Detected
■ - Selected as a contaminant of concern.
"BKGD" - Detected but not selected because concentrations were within background levels.
"BLK" - Detected but not selected because contaminant is a common laboratory blank; see text for further explanation.
* - Replaces original Table 3-3 in the Final Baseline RA; Dames & Moore, 1992a.
** - Site at which followup fieldwork was conducted on soil.

TABLE 3-3* (cont'd)

Summary of Contaminants of Concern Selected for Soil at UMDA

Chemicals	Operable Unit B (cont'd)					Operable Unit C				Operable Unit D	Operable Unit E		
	58 (a)	58 (b)	59 (a)	59 (b)	60 (a)	12** (a)	12** (b)	50 (b)	82 (b)	9 (a)	1 (a)	1 (b)	3
TAL Inorganics													
Aluminum	BKGD	BKGD	NA	NA	BKGD	BKGD	■	BKGD	BKGD	BKGD	BKGD	BKGD	NA
Antimony	ND	ND	NA	NA	ND	ND	■	ND	ND	■	■	■	NA
Arsenic	BKGD	BKGD	NA	NA	BKGD	BKGD	■	BKGD	BKGD	BKGD	■	■	NA
Barium	BKGD	BKGD	NA	NA	BKGD	BKGD	■	BKGD	BKGD	BKGD	■	■	NA
Beryllium	ND	ND	NA	NA	ND	BKGD	■	ND	ND	ND	■	■	NA
Cadmium	ND	ND	NA	NA	ND	ND	■	ND	ND	■	■	■	NA
Calcium	BKGD	BKGD	NA	NA	BKGD	BKGD	BKGD	BKGD	BKGD	BKGD	BKGD	BKGD	NA
Chromium	ND	ND	NA	NA	ND	BKGD	■	ND	ND	■	BKGD	BKGD	NA
Cobalt	ND	ND	NA	NA	ND	BKGD	BKGD	ND	ND	ND	ND	ND	NA
Copper	ND	ND	NA	NA	ND	BKGD	■	ND	ND	ND	■	■	NA
Iron	BKGD	BKGD	NA	NA	BKGD	BKGD	■	BKGD	BKGD	BKGD	BKGD	BKGD	NA
Lead	BKGD	BKGD	NA	NA	■	■	■	BKGD	BKGD	■	■	■	NA
Magnesium	BKGD	BKGD	NA	NA	BKGD	BKGD	BKGD	BKGD	BKGD	BKGD	BKGD	BKGD	NA
Manganese	BKGD	BKGD	NA	NA	BKGD	BKGD	BKGD	BKGD	BKGD	BKGD	BKGD	BKGD	NA
Mercury	ND	ND	NA	NA	ND	ND	■	ND	ND	ND -	ND	ND	NA
Nickel	ND	ND	NA	NA	ND	BKGD	■	ND	ND	ND	■	■	NA
Potassium	BKGD	BKGD	NA	NA	BKGD	BKGD	BKGD	BKGD	BKGD	BKGD	■	■	NA
Selenium	ND	ND	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	NA
Silver	ND	ND	NA	NA	■	■	■	BKGD	BKGD	■	■	■	NA
Sodium	BKGD	BKGD	NA	NA	BKGD	BKGD	■	BKGD	BKGD	BKGD	BKGD	BKGD	NA
Thallium	ND	ND	NA	NA	ND	BKGD	BKGD	ND	ND	ND	■	■	NA
Vanadium	BKGD	BKGD	NA	NA	BKGD	BKGD	BKGD	BKGD	BKGD	BKGD	BKGD	BKGD	NA
Zinc	BKGD	BKGD	NA	NA	BKGD	■	■	BKGD	BKGD	■	■	■	NA
Cyanide	ND	ND	NA	NA	NA	ND	ND	ND	ND	NA	NA	NA	NA
Explosives													
1,3,5-Trinitrobenzene	ND	ND	NA	NA	ND	ND	ND	ND	ND	ND	NA	NA	NA
1,3-Dinitrobenzene	ND	ND	NA	NA	ND	ND	ND	ND	ND	ND	NA	NA	NA
2,4,6-TNT	ND	ND	NA	NA	ND	ND	ND	ND	ND	ND	NA	NA	NA
2,4-DNT	ND	ND	NA	NA	ND	ND	ND	ND	ND	ND	NA	NA	NA
2,6-DNT	ND	ND	NA	NA	ND	ND	ND	ND	ND	ND	NA	NA	NA
HMX	ND	ND	NA	NA	ND	ND	ND	ND	ND	■	NA	NA	NA
RDX	ND	ND	NA	NA	ND	ND	ND	ND	ND	■	NA	NA	NA
Nitrobenzene	ND	ND	NA	NA	ND	ND	ND	ND	ND	ND	NA	NA	NA
Tetryl	ND	ND	NA	NA	ND	ND	ND	ND	ND	ND	NA	NA	NA
Other Inorganics													
Nitrate/nitrite	ND	ND	NA	NA	BKGD	NA	■	ND	ND	BKGD	NA	NA	NA
TCL Volatiles													
Acetone	ND	ND	NA	NA	NA	ND	ND	ND	ND	NA	NA	NA	NA
Chloroform	ND	ND	NA	NA	NA	ND	BLK	ND	BLK	NA	NA	NA	NA
Ethylbenzene	ND	ND	NA	NA	NA	ND	ND	ND	ND	NA	NA	NA	NA
Tetrachloroethylene	ND	ND	NA	NA	NA	ND	ND	ND	ND	NA	NA	NA	NA
Toluene	ND	ND	NA	NA	NA	ND	BLK	ND	ND	NA	NA	NA	NA
1,1,1-Trichloroethane	ND	ND	NA	NA	NA	ND	ND	ND	ND	NA	NA	NA	NA
Trichloroethylene	ND	ND	NA	NA	NA	ND	ND	ND	ND	NA	NA	NA	NA
Trichlorofluoromethane	ND	ND	NA	NA	NA	BLK	BLK	ND	ND	NA	NA	NA	NA
Xylenes	ND	ND	NA	NA	NA	ND	ND	ND	ND	NA	NA	NA	NA
TCL Semivolatiles													
Anthracene	ND	ND	NA	NA	NA	ND	■	ND	ND	NA	NA	NA	NA
Benzo(a)anthracene	ND	ND	NA	NA	NA	ND	■	ND	ND	NA	NA	NA	NA
Benzo(a)pyrene	ND	ND	NA	NA	NA	ND	■	ND	ND	NA	NA	NA	NA
Benzo(b)fluoranthene	ND	ND	NA	NA	NA	ND	■	ND	ND	NA	NA	NA	NA
Benzo(ghi)perylene	ND	ND	NA	NA	NA	ND	■	ND	ND	NA	NA	NA	NA
Benzo(k)fluoranthene	ND	ND	NA	NA	NA	■	■	ND	ND	NA	NA	NA	NA
Bis(2-ethylhexyl)phthalate	ND	ND	NA	NA	NA	ND	BLK	ND	ND	NA	NA	NA	NA
Chrysene	ND	ND	NA	NA	NA	■	■	ND	ND	NA	NA	NA	NA
Dibenzofuran	ND	ND	NA	NA	NA	ND	ND	ND	ND	NA	NA	NA	NA
Di-n-butyl phthalate	ND	ND	NA	NA	NA	ND	ND	ND	ND	NA	NA	NA	NA
Fluoranthene	ND	ND	NA	NA	NA	■	■	ND	ND	NA	NA	NA	NA
Indeno(1,2,3-cd)pyrene	ND	ND	NA	NA	NA	ND	■	ND	ND	NA	NA	NA	NA
2-Methylnapthalene	ND	ND	NA	NA	NA	ND	ND	ND	ND	NA	NA	NA	NA
Naphthalene	ND	ND	NA	NA	NA	ND	■	ND	ND	NA	NA	NA	NA
N-nitrosodiphenylamine	ND	ND	NA	NA	NA	ND	ND	ND	ND	NA	NA	NA	NA
Phenanthrene	ND	ND	NA	NA	NA	■	■	ND	ND	NA	NA	NA	NA
Pyrene	ND	ND	NA	NA	NA	■	■	ND	ND	NA	NA	NA	NA
Pesticides/PCBs													
Chlordane	NA	NA	NA	NA	NA	ND	ND	ND	NA	NA	NA	NA	NA
Dieldrin	NA	NA	NA	NA	NA	ND	■	ND	NA	NA	NA	NA	NA
DDD	NA	NA	NA	NA	NA	ND	■	ND	NA	NA	NA	NA	NA
DDE	NA	NA	NA	NA	NA	■	■	ND	NA	NA	NA	NA	NA
DDT	NA	NA	NA	NA	NA	■	■	ND	NA	NA	NA	NA	NA
Endrin	NA	NA	NA	NA	NA	ND	■	ND	NA	NA	NA	NA	NA
PCB-1260	NA	NA	NA	NA	NA	ND	■	ND	NA	NA	NA	NA	NA
Chem. Agt Breakdown Prod.													
EMPA	NA	NA	ND	ND	NA	NA	NA	NA	NA	ND	NA	NA	NA
IMPA	NA	NA	ND	ND	NA	NA	NA	NA	NA	ND	NA	NA	NA
Thiodiglycol	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

(a) - Soil to a depth of 2 feet.
(b) - Soil to a depth of 10 feet.
"NA" - Not Analyzed
"ND" - Not Detected
■ - Selected as a contaminant of concern.
"BKGD" - Detected but not selected because concentrations were within background levels.
"BLK" - Detected but not selected because contaminant is a common laboratory blank; see text for further explanation.
* - Replaces original Table 3-3 in the Final Baseline RA, Dames & Moore, 1992a.
** - Site at which followup fieldwork was conducted on soil.

TABLE 3-3* (cont'd)

Summary of Contaminants of Concern Selected for Soil at UMDA

Chemicals	Operable Unit E (cont'd)										Operable Unit F				
	25 (a)	26** (a)	34 (a)	35 (a)	35 (b)	37 (a)	44 Loc. I (a)	46 (a)	80 (b)	81 (a)	6 (b)	30** (a)	30** (b)	48** (a)	48** (b)
TAL Inorganics															
Aluminum	BKGD	BKGD	BKGD	NA	NA	BKGD	NA	BKGD	BKGD	BKGD	BKGD	BKGD	BKGD	BKGD	BKGD
Antimony	ND	ND	ND	NA	NA	ND	NA	ND	ND	ND	ND	ND	ND	ND	ND
Arsenic	BKGD	BKGD	BKGD	NA	NA	BKGD	NA	BKGD	BKGD	BKGD	BKGD	BKGD	BKGD	BKGD	BKGD
Barium	BKGD	BKGD	BKGD	NA	NA	■	NA	BKGD	BKGD	BKGD	BKGD	BKGD	BKGD	BKGD	BKGD
Beryllium	ND	BKGD	ND	NA	NA	ND	NA	ND	ND	ND	ND	ND	BKGD	ND	ND
Cadmium	ND	ND	ND	NA	NA	■	NA	ND	ND	ND	ND	BKGD	■	■	■
Calcium	BKGD	BKGD	BKGD	NA	NA	BKGD	NA	BKGD	BKGD	BKGD	BKGD	BKGD	BKGD	BKGD	BKGD
Chromium	ND	BKGD	■	NA	NA	■	NA	ND	ND	ND	ND	BKGD	BKGD	BKGD	BKGD
Cobalt	ND	BKGD	ND	NA	NA	ND	NA	ND	ND	ND	ND	BKGD	BKGD	BKGD	BKGD
Copper	ND	BKGD	ND	NA	NA	ND	NA	■	ND	ND	ND	BKGD	BKGD	■	■
Iron	BKGD	BKGD	BKGD	NA	NA	BKGD	NA	BKGD	BKGD	BKGD	BKGD	BKGD	BKGD	BKGD	BKGD
Lead	■	■	■	NA	NA	■	NA	■	BKGD	■	■	■	■	■	■
Magnesium	BKGD	BKGD	BKGD	NA	NA	BKGD	NA	BKGD	BKGD	BKGD	BKGD	BKGD	BKGD	BKGD	BKGD
Manganese	BKGD	BKGD	BKGD	NA	NA	BKGD	NA	BKGD	BKGD	BKGD	BKGD	BKGD	BKGD	BKGD	BKGD
Mercury	ND	ND	ND	NA	NA	■	NA	ND	ND	ND	■	ND	ND	■	■
Nickel	ND	BKGD	ND	NA	NA	ND	NA	ND	ND	ND	■	BKGD	BKGD	BKGD	BKGD
Potassium	BKGD	BKGD	BKGD	NA	NA	BKGD	NA	BKGD	BKGD	BKGD	BKGD	BKGD	BKGD	BKGD	BKGD
Selenium	ND	ND	ND	NA	NA	ND	NA	ND	ND	ND	ND	ND	ND	ND	ND
Silver	ND	■	ND	NA	NA	BKGD	NA	■	BKGD	■	■	■	■	■	■
Sodium	BKGD	BKGD	BKGD	NA	NA	BKGD	NA	BKGD	BKGD	BKGD	BKGD	BKGD	BKGD	BKGD	BKGD
Thallium	■	ND	ND	NA	NA	ND	NA	ND	ND	ND	ND	ND	BKGD	ND	ND
Vanadium	BKGD	BKGD	BKGD	NA	NA	BKGD	NA	BKGD	BKGD	BKGD	BKGD	BKGD	BKGD	BKGD	BKGD
Zinc	BKGD	■	■	NA	NA	■	NA	■	BKGD	BKGD	■	■	■	■	■
Cyanide	NA	NA	ND	NA	NA	NA	NA	NA	ND	NA	ND	NA	NA	ND	ND
Explosives															
1,3,5-Trinitrobenzene	NA	NA	ND	NA	NA	ND	NA	NA	ND	NA	ND	ND	ND	ND	ND
1,3-Dinitrobenzene	NA	NA	ND	NA	NA	ND	NA	NA	ND	NA	ND	ND	ND	ND	ND
2,4,6-TNT	NA	NA	ND	NA	NA	ND	NA	NA	ND	NA	ND	ND	ND	ND	ND
2,4-DNT	NA	NA	ND	NA	NA	ND	NA	NA	ND	NA	ND	ND	ND	ND	ND
2,6-DNT	NA	NA	ND	NA	NA	ND	NA	NA	ND	NA	ND	ND	ND	ND	ND
HMX	NA	NA	ND	NA	NA	ND	NA	NA	ND	NA	ND	ND	ND	ND	ND
RDX	NA	NA	ND	NA	NA	ND	NA	NA	ND	NA	ND	ND	ND	ND	ND
Nitrobenzene	NA	NA	ND	NA	NA	ND	NA	NA	ND	NA	ND	ND	ND	ND	ND
Tetryl	NA	NA	ND	NA	NA	ND	NA	NA	ND	NA	ND	ND	ND	ND	ND
Other Inorganics															
Nitrate/nitrite	NA	NA	BKGD	NA	NA	ND	NA	NA	ND	NA	■	BKGD	BKGD	■	■
TCL Volatiles															
Acetone	NA	NA	ND	NA	NA	ND	ND	NA	ND	NA	ND	ND	ND	ND	ND
Chloroform	NA	NA	ND	NA	NA	ND	ND	NA	BLK	NA	ND	ND	ND	ND	ND
Ethylbenzene	NA	NA	ND	NA	NA	ND	ND	NA	ND	NA	ND	ND	ND	ND	ND
Tetrachloroethylene	NA	NA	ND	NA	NA	■	ND	NA	ND	NA	ND	ND	ND	ND	ND
Toluene	NA	NA	ND	NA	NA	ND	ND	NA	ND	NA	ND	ND	ND	ND	ND
1,1,1-Trichloroethane	NA	NA	ND	NA	NA	ND	ND	NA	ND	NA	ND	ND	ND	ND	ND
Trichloroethylene	NA	NA	ND	NA	NA	ND	ND	NA	ND	NA	ND	ND	ND	ND	ND
Trichlorofluoromethane	NA	NA	BLK	NA	NA	ND	ND	NA	BLK	NA	ND	ND	ND	ND	ND
Xylenes	NA	NA	ND	NA	NA	ND	ND	NA	ND	NA	ND	ND	ND	ND	ND
TCL Semivolatiles															
Anthracene	NA	NA	ND	NA	NA	ND	ND	■	ND	NA	ND	ND	ND	ND	ND
Benzo(a)anthracene	NA	NA	ND	NA	NA	ND	ND	ND	ND	NA	ND	ND	ND	ND	ND
Benzo(a)pyrene	NA	NA	ND	NA	NA	ND	ND	ND	ND	NA	ND	ND	ND	ND	ND
Benzo(b)fluoranthene	NA	NA	ND	NA	NA	ND	ND	ND	ND	NA	ND	ND	ND	ND	ND
Benzo(ghi)perylene	NA	NA	ND	NA	NA	ND	ND	ND	ND	NA	ND	ND	ND	ND	ND
Benzo(k)fluoranthene	NA	NA	ND	NA	NA	ND	ND	ND	ND	NA	ND	ND	ND	ND	ND
Bis(2-ethylhexyl)phthalate	NA	NA	ND	NA	NA	■	ND	ND	ND	NA	ND	ND	ND	ND	ND
Chrysene	NA	NA	ND	NA	NA	ND	ND	ND	ND	NA	ND	ND	ND	ND	ND
Dibenzofuran	NA	NA	ND	NA	NA	ND	ND	■	ND	NA	ND	ND	ND	ND	ND
Di-n-butyl phthalate	NA	NA	■	NA	NA	ND	ND	■	ND	NA	ND	ND	ND	ND	ND
Fluoranthene	NA	NA	ND	NA	NA	ND	ND	■	ND	NA	ND	ND	ND	ND	ND
Indeno(1,2,3-cd)pyrene	NA	NA	ND	NA	NA	ND	ND	ND	ND	NA	ND	ND	ND	ND	ND
2-Methylnapthalene	NA	NA	ND	NA	NA	ND	ND	■	ND	NA	ND	ND	ND	ND	ND
Naphthalene	NA	NA	ND	NA	NA	ND	ND	■	ND	NA	ND	ND	ND	ND	ND
N-nitrosodiphenylamine	NA	NA	ND	NA	NA	ND	ND	■	ND	NA	■	ND	ND	ND	ND
Phenanthrene	NA	NA	■	NA	NA	ND	ND	■	ND	NA	ND	ND	ND	ND	ND
Pyrene	NA	NA	ND	NA	NA	ND	ND	■	ND	NA	ND	ND	ND	ND	ND
Pesticides/PCBs															
Chlordane	NA	NA	NA	ND	■	NA	NA	NA	NA	NA	ND	ND	ND	ND	ND
Dieldrin	NA	NA	NA	ND	ND	NA	NA	NA	NA	NA	ND	ND	ND	ND	ND
DDD	NA	NA	NA	ND	ND	NA	NA	NA	NA	NA	ND	■	■	■	■
DDE	NA	NA	NA	■	■	NA	NA	NA	NA	NA	ND	■	■	■	■
DDT	NA	NA	NA	■	■	NA	NA	NA	NA	NA	■	■	■	■	■
Endrin	NA	NA	NA	ND	ND	NA	NA	NA	NA	NA	ND	ND	ND	ND	ND
PCB-1260	NA	NA	NA	NA	NA	NA	NA	ND	NA	NA	■	ND	ND	ND	ND
Chem. Agt Breakdown Prod.															
EMPA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
IMPA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Thiodiglycol	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

(a) - Soil to a depth of 2 feet.

(b) - Soil to a depth of 10 feet.

"NA" - Not Analyzed

"ND" - Not Detected

■ - Selected as a contaminant of concern.

"BKGD" - Detected but not selected because concentrations were within background levels.

"BLK" - Detected but not selected because contaminant is a common laboratory blank; see text for further explanation.

* - Replaces original Table 3-3 in the Final Baseline RA; Dames & Moore, 1992a.

** - Site at which followup fieldwork was conducted on soil.

TABLE 3-3* (cont'd)

Summary of Contaminants of Concern Selected for Soil at UMDA

Chemicals	Operable Unit G	Operable Unit H					Operable Unit I				
	11	22** (a)	22** (b)	27 (a)	44** Loc. II (a)	44** Loc. II (b)	10 (a)	10 (b)	33 (a)	33 (b)	49 (a)
TAL Inorganics											
Aluminum	NA	BKGD	BKGD	BKGD	BKGD	■	BKGD	BKGD	NA	NA	NA
Antimony	NA	■	■	ND	ND	ND	■	■	NA	NA	NA
Arsenic	NA	BKGD	BKGD	BKGD	BKGD	BKGD	BKGD	BKGD	NA	NA	NA
Barium	NA	■	■	BKGD	BKGD	BKGD	BKGD	BKGD	NA	NA	NA
Beryllium	NA	■	■	ND	BKGD	BKGD	ND	ND	NA	NA	NA
Cadmium	NA	■	■	ND	ND	ND	ND	ND	NA	NA	NA
Calcium	NA	BKGD	BKGD	BKGD	BKGD	BKGD	BKGD	BKGD	NA	NA	NA
Chromium	NA	BKGD	BKGD	ND	BKGD	BKGD	ND	ND	NA	NA	NA
Cobalt	NA	BKGD	BKGD	ND	BKGD	BKGD	ND	ND	NA	NA	NA
Copper	NA	■	■	ND	BKGD	BKGD	ND	ND	NA	NA	NA
Iron	NA	BKGD	■	BKGD	BKGD	BKGD	BKGD	BKGD	NA	NA	NA
Lead	NA	■	■	■	■	■	BKGD	BKGD	NA	NA	NA
Magnesium	NA	BKGD	BKGD	BKGD	BKGD	BKGD	BKGD	BKGD	NA	NA	NA
Manganese	NA	BKGD	BKGD	BKGD	BKGD	BKGD	BKGD	BKGD	NA	NA	NA
Mercury	NA	■	■	ND	ND	ND	ND	ND	NA	NA	NA
Nickel	NA	BKGD	BKGD	ND	BKGD	■	ND	ND	NA	NA	NA
Potassium	NA	■	■	BKGD	BKGD	BKGD	BKGD	BKGD	NA	NA	NA
Selenium	NA	ND	ND	ND	ND	ND	ND	ND	NA	NA	NA
Silver	NA	■	■	BKGD	■	■	ND	BKGD	NA	NA	NA
Sodium	NA	BKGD	BKGD	BKGD	BKGD	BKGD	BKGD	BKGD	NA	NA	NA
Thallium	NA	■	■	ND	BKGD	BKGD	ND	ND	NA	NA	NA
Vanadium	NA	BKGD	BKGD	BKGD	BKGD	BKGD	BKGD	BKGD	NA	NA	NA
Zinc	NA	■	■	■	BKGD	BKGD	BKGD	BKGD	NA	NA	NA
Cyanide	NA	ND	NA	NA	ND	ND	ND	ND	NA	NA	NA
Explosives											
1,3,5-Trinitrobenzene	NA	ND	ND	NA	NA	NA	ND	ND	NA	NA	NA
1,3-Dinitrobenzene	NA	ND	ND	NA	NA	NA	ND	ND	NA	NA	NA
2,4,6-TNT	NA	ND	ND	NA	NA	NA	ND	ND	NA	NA	NA
2,4-DNT	NA	ND	ND	NA	NA	NA	ND	ND	NA	NA	NA
2,6-DNT	NA	ND	ND	NA	NA	NA	ND	ND	NA	NA	NA
HMX	NA	ND	ND	NA	NA	NA	ND	ND	NA	NA	NA
RDX	NA	ND	ND	NA	NA	NA	ND	ND	NA	NA	NA
Nitrobenzene	NA	ND	ND	NA	NA	NA	ND	ND	NA	NA	NA
Tetryl	NA	ND	ND	NA	NA	NA	ND	ND	NA	NA	NA
Other Inorganics											
Nitrate/nitrite	NA	NA	NA	NA	NA	NA	BKGD	ND	NA	NA	NA
TCL Volatiles											
Acetone	NA	BLK	BLK	ND	ND	ND	ND	ND	NA	NA	NA
Chloroform	NA	ND	ND	ND	ND	ND	BLK	ND	NA	NA	NA
Ethylbenzene	NA	ND	ND	ND	ND	ND	ND	ND	NA	NA	NA
Tetrachloroethylene	NA	ND	ND	ND	ND	ND	ND	ND	NA	NA	NA
Toluene	NA	ND	ND	ND	ND	ND	ND	ND	NA	NA	NA
1,1,1-Trichloroethane	NA	ND	ND	ND	ND	ND	ND	ND	NA	NA	NA
Trichloroethylene	NA	ND	ND	ND	ND	ND	ND	ND	NA	NA	NA
Trichlorofluoromethane	NA	BLK	BLK	BLK	ND	ND	BLK	BLK	NA	NA	NA
Xylenes	NA	ND	ND	ND	ND	ND	ND	ND	NA	NA	NA
TCL Semivolatiles											
Anthracene	NA	ND	NA	ND	ND	ND	ND	ND	NA	NA	NA
Benzo(a)anthracene	NA	ND	NA	ND	ND	ND	ND	ND	NA	NA	NA
Benzo(a)pyrene	NA	ND	NA	ND	ND	ND	ND	ND	NA	NA	NA
Benzo(b)fluoranthene	NA	ND	NA	ND	ND	ND	ND	ND	NA	NA	NA
Benzo(ghi)perylene	NA	ND	NA	ND	ND	ND	ND	ND	NA	NA	NA
Benzo(k)fluoranthene	NA	ND	NA	ND	ND	ND	ND	ND	NA	NA	NA
Bis(2-ethylhexyl)phthalate	NA	ND	NA	ND	ND	ND	ND	ND	NA	NA	NA
Chrysene	NA	ND	NA	ND	ND	ND	ND	ND	NA	NA	NA
Dibenzofuran	NA	ND	NA	ND	ND	ND	ND	ND	NA	NA	NA
Di-n-butyl phthalate	NA	ND	NA	ND	ND	ND	ND	ND	NA	NA	NA
Fluoranthene	NA	ND	NA	■	ND	ND	ND	ND	NA	NA	NA
Indeno(1,2,3-cd)pyrene	NA	ND	NA	ND	ND	ND	ND	ND	NA	NA	NA
2-Methylnapthalene	NA	ND	NA	ND	ND	ND	ND	ND	NA	NA	NA
Naphthalene	NA	ND	NA	ND	ND	ND	ND	ND	NA	NA	NA
N-nitrosodiphenylamine	NA	ND	NA	ND	ND	ND	ND	ND	NA	NA	NA
Phenanthrene	NA	ND	NA	■	ND	ND	ND	ND	NA	NA	NA
Pyrene	NA	ND	NA	■	ND	ND	ND	ND	NA	NA	NA
Pesticides/PCBs											
Chlordane	NA	ND	ND	ND	NA	NA	NA	NA	NA	NA	NA
Dieldrin	NA	ND	ND	ND	NA	NA	NA	NA	NA	NA	NA
DDD	NA	■	■	ND	NA	NA	NA	NA	NA	NA	NA
DDE	NA	■	■	ND	NA	NA	NA	NA	NA	NA	NA
DDT	NA	■	■	■	NA	NA	NA	NA	NA	NA	NA
Endrin	NA	ND	ND	ND	NA	NA	NA	NA	NA	NA	NA
PCB-1260	NA	ND	ND	ND	ND	ND	NA	NA	NA	NA	NA
Chem. Agt Breakdown Prod.											
EMPA	NA	NA	NA	NA	NA	NA	ND	ND	ND	ND	ND
IMPA	NA	NA	NA	NA	NA	NA	ND	ND	ND	ND	ND
Thiodiglycol	NA	NA	NA	NA	NA	NA	ND	ND	NA	NA	NA

(a) - Soil to a depth of 2 feet.
(b) - Soil to a depth of 10 feet.
"NA" - Not Analyzed
"ND" - Not Detected
■ - Selected as a contaminant of concern.
"BKGD" - Detected but not selected because concentrations were within background levels.
"BLK" - Detected but not selected because contaminant is a common laboratory blank; see text for further explanation.
* - Replaces original Table 3-3 in the Final Baseline RA; Dames & Moore, 1992a.
** - Site at which followup fieldwork was conducted on soil.

TABLE 3-3* (cont'd)

Summary of Contaminants of Concern Selected for Soil at UMDA

Chemicals	Operable Unit J													
	2** (a)	25 (a)	29 420 (b)	29 417 (b)	29 419 (b)	29 486 (b)	29 655-1 (b)	29 655-2 (b)	29 622 (b)	39 (a)	45 (612) (a)	45 (617) (a)	53 (a)	81 (a)
TAL Inorganics														
Aluminum	ND	BKGD	NA	BKGD	BKGD	BKGD	BKGD	BKGD	BKGD	BKGD	BKGD	BKGD	BKGD	BKGD
Antimony	ND	ND	NA	ND	ND	ND	ND	ND	ND	■	ND	ND	ND	ND
Arsenic	ND	BKGD	NA	BKGD	BKGD	BKGD	BKGD	BKGD	BKGD	BKGD	BKGD	BKGD	BKGD	BKGD
Barium	ND	BKGD	NA	BKGD	BKGD	BKGD	BKGD	BKGD	BKGD	BKGD	BKGD	BKGD	BKGD	BKGD
Beryllium	ND	ND	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Cadmium	ND	ND	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Calcium	ND	BKGD	NA	BKGD	BKGD	BKGD	BKGD	BKGD	BKGD	BKGD	BKGD	BKGD	BKGD	BKGD
Chromium	■	ND	NA	ND	■	ND	ND	ND	ND	ND	ND	ND	ND	ND
Cobalt	ND	ND	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Copper	ND	ND	NA	ND	ND	ND	ND	ND	ND	■	■	ND	ND	ND
Iron	ND	BKGD	NA	BKGD	BKGD	BKGD	BKGD	BKGD	BKGD	BKGD	BKGD	■	BKGD	BKGD
Lead	■	BKGD	BKGD	BKGD	BKGD	BKGD	BKGD	BKGD	BKGD	■	■	BKGD	BKGD	BKGD
Magnesium	ND	BKGD	NA	BKGD	BKGD	BKGD	BKGD	BKGD	BKGD	BKGD	BKGD	BKGD	BKGD	BKGD
Manganese	ND	BKGD	NA	BKGD	BKGD	BKGD	BKGD	BKGD	BKGD	BKGD	BKGD	BKGD	BKGD	BKGD
Mercury	ND	ND	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Nickel	ND	■	NA	ND	■	ND	ND	ND	ND	ND	■	■	■	ND
Potassium	ND	BKGD	NA	BKGD	BKGD	BKGD	BKGD	BKGD	BKGD	BKGD	BKGD	BKGD	■	BKGD
Selenium	ND	ND	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Silver	BKGD	BKGD	NA	■	■	BKGD	■	ND	BKGD	■	BKGD	■	BKGD	BKGD
Sodium	ND	BKGD	NA	BKGD	BKGD	BKGD	BKGD	BKGD	BKGD	BKGD	BKGD	BKGD	BKGD	BKGD
Thallium	ND	■	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Vanadium	ND	BKGD	NA	BKGD	■	BKGD	BKGD	BKGD	BKGD	BKGD	BKGD	BKGD	BKGD	BKGD
Zinc	■	BKGD	NA	BKGD	BKGD	BKGD	BKGD	BKGD	BKGD	■	■	■	BKGD	BKGD
Cyanide	NA	NA	NA	ND	NA	NA	ND	ND	ND	NA	NA	NA	ND	NA
Explosives														
1,3,5-Trinitrobenzene	ND	NA	NA	ND	ND	ND	ND	ND	ND	ND	NA	NA	NA	NA
1,3-Dinitrobenzene	ND	NA	NA	ND	ND	ND	ND	ND	ND	ND	NA	NA	NA	NA
2,4,6-TNT	ND	NA	NA	ND	ND	ND	ND	ND	ND	ND	NA	NA	NA	NA
2,4-DNT	ND	NA	NA	ND	ND	ND	ND	ND	ND	ND	NA	NA	NA	NA
2,6-DNT	ND	NA	NA	ND	ND	ND	ND	ND	ND	ND	NA	NA	NA	NA
HMX	ND	NA	NA	ND	ND	ND	ND	ND	ND	ND	NA	NA	NA	NA
RDX	ND	NA	NA	ND	ND	ND	ND	ND	ND	ND	NA	NA	NA	NA
Nitrobenzene	ND	NA	NA	ND	ND	ND	ND	ND	ND	ND	NA	NA	NA	NA
Tetryl	ND	NA	NA	ND	ND	ND	ND	ND	ND	ND	NA	NA	NA	NA
Other Inorganics														
Nitrate/nitrite	NA	NA	BKGD	BKGD	BKGD	BKGD	BKGD	BKGD	BKGD	BKGD	NA	NA	NA	NA
TCL Volatiles														
Acetone	NA	NA	NA	NA	ND	NA	ND	ND	NA	NA	NA	NA	ND	NA
Chloroform	NA	NA	NA	NA	ND	NA	ND	ND	NA	NA	NA	NA	ND	NA
Ethylbenzene	NA	NA	NA	NA	ND	NA	ND	ND	NA	NA	NA	NA	ND	NA
Tetrachloroethylene	NA	NA	NA	NA	ND	NA	ND	ND	NA	NA	NA	NA	ND	NA
Toluene	NA	NA	NA	NA	ND	NA	ND	ND	NA	NA	NA	NA	ND	NA
1,1,1-Trichloroethane	NA	NA	NA	NA	ND	NA	■	ND	NA	NA	NA	NA	ND	NA
Trichloroethylene	NA	NA	NA	NA	ND	NA	ND	ND	NA	NA	NA	NA	ND	NA
Trichlorofluoromethane	NA	NA	NA	NA	ND	NA	BLK	ND	NA	NA	NA	NA	ND	NA
Xylenes	NA	NA	NA	NA	ND	NA	ND	ND	NA	NA	NA	NA	ND	NA
TCL Semivolatiles														
Anthracene	NA	NA	NA	NA	ND	NA	ND	ND	ND	NA	NA	NA	■	NA
Benzo(a)anthracene	NA	NA	NA	NA	ND	NA	ND	ND	ND	NA	NA	NA	ND	NA
Benzo(a)pyrene	NA	NA	NA	NA	ND	NA	ND	ND	ND	NA	NA	NA	ND	NA
Benzo(b)fluoranthene	NA	NA	NA	NA	ND	NA	ND	ND	ND	NA	NA	NA	ND	NA
Benzo(ghi)perylene	NA	NA	NA	NA	ND	NA	ND	ND	ND	NA	NA	NA	ND	NA
Benzo(k)fluoranthene	NA	NA	NA	NA	ND	NA	ND	ND	ND	NA	NA	NA	ND	NA
Bis(2-ethylhexyl)phthalate	NA	NA	NA	NA	ND	NA	ND	ND	ND	NA	NA	NA	ND	NA
Chrysene	NA	NA	NA	NA	ND	NA	ND	ND	ND	NA	NA	NA	ND	NA
Dibenzofuran	NA	NA	NA	NA	ND	NA	ND	ND	ND	NA	NA	NA	ND	NA
Di-n-butyl phthalate	NA	NA	NA	NA	ND	NA	ND	ND	ND	NA	NA	NA	ND	NA
Fluoranthene	NA	NA	NA	NA	ND	NA	ND	ND	ND	NA	NA	NA	ND	NA
Indeno(1,2,3-cd)pyrene	NA	NA	NA	NA	ND	NA	ND	ND	ND	NA	NA	NA	ND	NA
2-Methylnapthalene	NA	NA	NA	NA	ND	NA	ND	ND	ND	NA	NA	NA	ND	NA
Naphthalene	NA	NA	NA	NA	ND	NA	ND	ND	ND	NA	NA	NA	ND	NA
N-nitrosodiphenylamine	NA	NA	NA	NA	ND	NA	ND	ND	ND	NA	NA	NA	ND	NA
Phenanthrene	NA	NA	NA	NA	ND	NA	ND	ND	■	NA	NA	NA	■	NA
Pyrene	NA	NA	NA	NA	ND	NA	ND	ND	ND	NA	NA	NA	■	NA
Pesticides/PCBs														
Chlordane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dieldrin	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DDD	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DDE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DDT	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Endrin	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
PCB-1260	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	ND	NA
Chem. Agt Breakdown Prod.														
EMPA	NA	NA	NA	NA	NA	NA	ND	ND	ND	NA	NA	NA	NA	NA
IMPA	NA	NA	NA	NA	NA	NA	ND	ND	ND	NA	NA	NA	NA	NA
Thiodiglycol	NA	NA	NA	NA	NA	NA	ND	ND	NA	NA	NA	NA	NA	NA

(a) - Soil to a depth of 2 feet.
(b) - Soil to a depth of 10 feet.
"NA" - Not Analyzed
"ND" - Not Detected
■ - Selected as a contaminant of concern.
"BKGD" - Detected but not selected because concentrations were within background levels.
"BLK" - Detected but not selected because contaminant is a common laboratory blank; see text for further explanation.
* - Replaces original Table 3-3 in the Final Baseline RA; Dames & Moore, 1992a.
** - Site at which followup fieldwork was conducted on said.

Operable Unit B:

- Site 15: 2,4-DNT, 2,6-DNT (not detected during the RI).
- Site 17: Mercury (not detected during the RI).
- Site 18: 1,1,1-TCA, di-n-butyl phthalate, phenanthrene, DDE, and DDT (not detected during the RI).
- Site 19: Tetryl (not detected during the RI).

Operable Unit C:

- Site 12: Lead, silver, zinc, benzo(k)fluoranthene, chrysene, fluoranthene, phenanthrene, pyrene, DDE, and DDT. (Site 12 surface soil was not sampled during the RI.)

Operable Unit E:

- Site 26: Silver (not an analyte during the RI).

Operable Unit F:

- Site 30: No additional contaminants of concern.
- Site 48: No additional contaminants of concern.

Operable Unit H:

- Site 22: Mercury, beryllium, thallium (not detected during the RI).
- Site 44 (Location II): Lead, silver (metals were not analytes during the RI).

Operable Unit J:

- Site 2: Chromium, lead, zinc. (Site 2 surface soil was not sampled during the RI.)

Additional subsurface soil contaminants of concern identified based on followup fieldwork results are as follows:

Operable Unit A:

- Site 5: 1,3,5-TNB, 1,3-DNB, 2,4,6-TNT, 2,4-DNT, HMX, RDX, tetryl, nitrate/nitrite. (Site 5 subsurface soil was not sampled during the RI.)
- Site 47: Dieldrin (not detected during the RI).

Operable Unit B

- Site 15: 2,4-DNT, 2,6-DNT (not detected during the RI).
- Site 18: Antimony, selenium, 1,1,1-TCA, di-n-butyl phthalate, phenanthrene, PCB 1260 (not detected during the RI).
- Site 19: Tetryl (not detected during the RI).

Operable Unit C:

- Site 12: Aluminum and sodium (within background during the RI); antimony, cadmium, anthracene, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(g,h,i)perylene, benzo(k)fluoranthene, chrysene, fluoranthene, indeno(1,2,3-cd)pyrene, naphthalene, phenanthrene, pyrene, dieldrin, endrin (not detected during the RI).

Operable Unit F:

- Site 30: Cadmium, lead, silver, zinc, DDD, DDE, DDT. (Site 30 subsurface soil was not sampled during the RI.)
- Site 48: Cadmium, copper, lead, mercury, silver, zinc, nitrate/nitrite, DDD, DDE, DDT. (Site 48 subsurface soil was not sampled during the RI.)

Operable Unit H:

- Site 22: Antimony, barium, beryllium, cadmium, copper, iron, lead, mercury, potassium, silver, thallium, zinc, DDD, DDE, DDT. (Site 22 subsurface soil was not sampled during the RI.)

- Site 44 (Location II): Aluminum, lead, nickel, silver. (Site 44 (Location II) subsurface soil was not sampled during the RI.)

3.2* OPERABLE UNIT A: EXPLOSIVE WASHOUT LAGOONS AND ASSOCIATED BUILDINGS

3.2.2* Site 5: Explosive Washout Plant

3.2.2.1 Groundwater and Wipe Samples. No additional groundwater or wipe sampling was planned at Site 5; therefore, groundwater and wipe data for this site are not discussed in the addendum.

3.2.2.2* Soil

- Surface Soil (to a depth of 2 feet)--During the original RI fieldwork, 16 surface soil samples were collected at Site 5 near the plant exit doors and where wastewater may have overflowed along the metal trough. These samples were analyzed for explosives and nitrite/nitrate. During the followup fieldwork, 23 surface soil samples were collected at this site. These samples were analyzed only for explosives. The occurrence and distribution of analytes detected in these samples are presented in Table 3-8*, and the contaminant selection rationale is summarized in Table 3-3*.

  Nitrite/nitrate (detected at above-background concentrations) and seven detected explosives (Table 3-8*) are identified as contaminants of concern in surface soil at Site 5.

- Surface and Subsurface Soil (to a depth of 10 feet)--During the followup fieldwork, 35 soil samples were collected from this depth interval and analyzed only for explosives. The occurrence and distribution of analytes detected in these samples and in those collected during the original RI fieldwork are presented in Table 3-8A, and the contaminant selection rationale is summarized in Table 3-3*.

TABLE 3–8*

Occurrence and Distribution of Analytes Detected in Surface Soil (to a depth of 2 feet) at Site 5

COMPOUND	UNITS	Frequency of Detection	Percent Positive Detections	Range of Sample Detection Limits	Range of Detected Concentrations	Upper 95 Percent Confidence Limit (a)	Location of Max. Conc.	Comparison Criteria Concentration	Comparison Criteria Type	Number of Exceedances
Explosives										
135TNB	UGG	9/39	23	0.488	0.619 – 45	5.67	S05B008		NSA	NA
13DNB	UGG	1/39	3	0.496	1.05	0.302	S05B008		NSA	NA
246TNT	UGG	16/39	41	0.456	1.02 – 9900	758	S05B008		NSA	NA
24DNT	UGG	2/39	5	0.424	5.6 – 5.94	0.824	S05C018		NSA	NA
HMX	UGG	18/39	46	0.666	1.05 – 150	17.6	S05B006		NSA	NA
RDX	UGG	24/39	62	0.587	1.1 – 1600	165	S05B006		NSA	NA
TETRYL	UGG	1/39	3	0.731	45	3.39	S05C039		NSA	NA
Other Inorganics										
NITRATE/NITRITE	UGG	16/16	100	DLNA	0.673 – 22	8.3	S05B006	9.9	Bkgd	2

(a) – Upper 95 percent confidence limit on the arithmetic mean. Calculated assuming one–half the detection level as the concentration for those samples in which a given analyte was not detected.
(b) – Since the frequency of detection for this chemical is 1/1, the concentration presented is not the 95 percent upper confidence limit, but the concentration detected in the sole sample collected.
(c) – The 95 percent upper confidence limit on the arithmetic mean exceeds the maximum detected concentration; therefore, the maximum detected value is presented (USEPA, 1989b).
– Contaminant of concern
Bkgd – The maximum detected concentration in UMDA background soils (see Section 3.1).
DLNA – Detection level not available. The detection levels could not be ascertained because constituents were detected in all relevant samples.
NA – Not applicable.
NSA – No standard for comparison available.
TAL – Target analyte list.
TCL – Target compound list.
TIC – Tentatively identified compound.
UGG – ug/g

* Replaces original TABLE 3–8 in the Final Baseline RA; Dames & Moore, 1992a.

TABLE 3–8A

Occurrence and Distribution of Analytes Detected in Surface and Subsurface Soil (to a depth of 10 feet) at Site 5

COMPOUND	UNITS	Frequency of Detection	Percent Positive Detections	Range of Sample Detection Limits	Range of Detected Concentrations	Upper 95 Percent Confidence Limit (a)	Location of Max. Conc.	Comparison Criteria Concentration	Comparison Criteria Type	Number of Exceedances
Explosives										
135TNB	UGG	10/51	20	0.488	0.619 – 45	4.52	S05B008		NSA	NA
13DNB	UGG	1/51	2	0.496	1.05	0.29	S05B008		NSA	NA
246TNT	UGG	19/51	37	0.456	0.627 – 9900	581	S05B008		NSA	NA
24DNT	UGG	3/51	6	0.424	0.465 – 5.94	0.686	S05C018		NSA	NA
HMX	UGG	24/51	47	0.666	0.743 – 150	13.8	S05B006		NSA	NA
RDX	UGG	32/51	63	0.587	0.71 – 1600	127	S05B006		NSA	NA
TETRYL	UGG	1/51	2	0.731	45	2.68	S05C039		NSA	NA
Other Inorganics										
NITRATE/NITRITE	UGG	16/16	100	DLNA	0.673 – 22	8.3	S05B006	9.9	Bkgd	2

(a) – Upper 95 percent confidence limit on the arithmetic mean. Calculated assuming one–half the detection level as the concentration for those samples in which a given analyte was not detected.
(b) – Since the frequency of detection for this chemical is 1/1, the concentration presented is not the 95 percent upper confidence limit, but the concentration detected in the sole sample collected.
(c) – The 95 percent upper confidence limit on the arithmetic mean exceeds the maximum detected concentration; therefore, the maximum detected value is presented (USEPA, 1989b).
– Contaminant of concern
Bkgd – The maximum detected concentration in UMDA background soils (see Section 3.1).
DLNA – Detection level not available. The detection levels could not be ascertained because constituents were detected in all relevant samples.
NA – Not applicable.
NSA – No standard for comparison available.
TAL – Target analyte list.
TCL – Target compound list.
TIC – Tentatively identified compound.
UGG – ug/g

Nitrite/nitrate (detected at above-background concentrations) and seven detected explosives (Table 3-8A) are identified as contaminants of concern.

3.2.3* Site 36: Building 493 Paint Sludge Discharge Area

3.2.3.1* Groundwater. Groundwater contamination at this site is unconfirmed and is not considered to be probable. No groundwater sampling was planned for the RI or the followup fieldwork.

3.2.3.2* Soil. During the original RI fieldwork, five surface soil samples were collected near suspected discharge locations and associated flow areas and analyzed for Target Compound List (TCL) volatile organic analytes (VOAs), TCL base-neutral and acid extractable organics (BNAs), Target Analyte List (TAL) inorganics, explosives, and nitrite/nitrate. Six additional surface soil samples were collected during the followup fieldwork and analyzed for TAL inorganics and TCL BNAs. The occurrence and distribution of analytes detected in these samples are presented in Table 3-9*, and the contaminant selection rationale is summarized in Table 3-3*.

Nine of the 19 inorganics detected (Table 3-9*), and nitrite/nitrate, were detected above background levels and are selected as contaminants of concern.

Trichlorofluoromethane, a common laboratory contaminant, was detected at low concentrations (i.e., near the sample quantitation limit) in two samples at this site. Although it was not detected in method blanks associated with the sample set, it does not appear to be a site-related chemical based on site history information, and it was detected in other laboratory blanks at concentrations exceeding levels detected in site samples. Therefore, trichlorofluoromethane is not included as a contaminant of concern for Site 36.

Bis(2-ethylhexyl) phthalate was detected in two of the 11 soil samples at a level just slightly above the detection limit. Although it was not detected in method blanks associated with the sample set, it does not appear to be a site-related chemical based

TABLE 3-9*

Occurrence and Distribution of Analytes Detected in Surface Soil (to a depth of 2 feet) at Site 36

COMPOUND	UNITS	Frequency of Detection	Percent Positive Detections	Range of Sample Detection Limits	Range of Detected Concentrations	Upper 95 Percent Confidence Limit (a)	Location of Max. Conc.	Comparison Criteria Concentration	Comparison Criteria Type	Number of Exceedances
TAL Inorganics										
ALUMINUM	UGG	11/11	100	DLNA	1370 – 5300	4872	S36A004	8604	Bkgd	0
ARSENIC	UGG	11/11	100	DLNA	1.04 – 4.62	2.72	S36A004	5.24	Bkgd	0
BARIUM	UGG	11/11	100	DLNA	48.7 – 170	118	S36A004	233	Bkgd	0
BERYLLIUM	UGG	1/11	9	0.5 – 1.86	0.593	0.593(c)	S36B009	1.86	Bkgd	0
CADMIUM	UGG	4/11	36	0.7 – 3.05	6.43 – 760	216	S36A004	3.05	Bkgd	4
CALCIUM	UGG	11/11	100	DLNA	2290 – 12000	8015	S36A004	29006	Bkgd	0
CHROMIUM	UGG	8/11	73	12.7	5.4 – 143	63	S36A004	32.7	Bkgd	3
COBALT	UGG	7/11	64	15	4.01 – 25.3	11.5	S36A004	15	Bkgd	1
COPPER	UGG	7/11	64	58.6	6.68 – 141	51.1	S36A001	58.6	Bkgd	1
IRON	UGG	11/11	100	DLNA	14000 – 35000	22210	S36A004	26233	Bkgd	1
LEAD	UGG	11/11	100	DLNA	3.09 – 340	139	S36B007	8.37	Bkgd	4
MAGNESIUM	UGG	11/11	100	DLNA	1080 – 6480	4658	S36A004	8585	Bkgd	0
MANGANESE	UGG	11/11	100	DLNA	170 – 654	436	S36A004	874	Bkgd	0
NICKEL	UGG	7/11	64	12.6	6.83 – 47.6	17.7	S36A004	12.6	Bkgd	1
POTASSIUM	UGG	11/11	100	DLNA	249 – 1320	1159	S36A001	2179	Bkgd	0
SILVER	UGG	3/11	27	0.025	0.052 – 1.05	0.315	S36B007	0.038	Bkgd	3
SODIUM	UGG	11/11	100	DLNA	196 – 538	415	S36A004	978	Bkgd	0
VANADIUM	UGG	11/11	100	DLNA	10.8 – 78	62.3	S36A004	131	Bkgd	0
ZINC	UGG	11/11	100	DLNA	38.4 – 2330	707	S36A004	94	Bkgd	4
TCL Volatiles										
TRICHLOROFLUOROMETHANE	UGG	2/5	40	0.006	0.005 – 0.009	0.007	S36A001		NSA	NA
TCL Semivolatiles										
BIS(2-ETHYLHEXYL) PHTHALATE	UGG	2/11	18	0.62 – 6.2	0.89 – 1.24	1.17	S36A001		NSA	NA
TCL Semivolatile TICs										
HEXADECANOIC ACID	UGG	1/1	100	DLNA	0.303	0.303(b)	S36A001		NSA	NA
STYRENE	UGG	4/4	100	DLNA	0.203 – 0.505	0.471	S36A001		NSA	NA

TABLE 3–9* (cont'd)
Occurrence and Distribution of Analytes Detected in Surface Soil (to a depth of 2 feet) at Site 36

COMPOUND	UNITS	Frequency of Detection	Percent Positive Detections	Range of Sample Detection Limits	Range of Detected Concentrations	Upper 95 Percent Confidence Limit (a)	Location of Max. Conc.	Comparison Criteria Concentration	Comparison Criteria Type	Number of Exceedances
Other Inorganics										
NITRATE/NITRITE	UGG	5/5	100	DLNA	0.695 – 12.2	8.22	S36A001	9.9	Bkgd	1

(a) – Upper 95 percent confidence limit on the arithmetic mean. Calculated assuming one–half the detection level as the concentration for those samples in which a given analyte was not detected.
(b) – Since the frequency of detection for this chemical is 1/1, the concentration presented is not the 95 percent upper confidence limit, but the concentration detected in the sole sample collected.
(c) – The 95 percent upper confidence limit on the arithmetic mean exceeds the maximum detected concentration; therefore, the maximum detected value is presented (USEPA, 1989b).
– Contaminant of concern
Bkgd – The maximum detected concentration in UMDA background soils (see Section 3.1).
DLNA – Detection level not available. The detection levels could not be ascertained because constituents were detected in all relevant samples.
NA – Not applicable.
NSA – No standard for comparison available.
TAL – Target analyte list.
TCL – Target compound list.
TIC – Tentatively identified compound.
UGG – ug/g
* Replaces original TABLE 3–9 in the Final Baseline RA; Dames & Moore, 1992a.

on site history information, and it is a common laboratory contaminant. Therefore, bis(2-ethylhexyl) phthalate is not selected as a contaminant of concern for this site.

Two TCL semivolatile TICs were also detected (Table 3-9*), but they are not selected as contaminants of concern.

Explosives are not considered to be contaminants of concern, because they were not detected in any of the soil samples from Site 36.

3.2.4* Site 47: Boiler/Laundry Effluent Discharge Site

3.2.4.1* Groundwater. No additional groundwater sampling was planned at Site 47 during followup fieldwork; therefore, groundwater data for this site are not included in the addendum.

3.2.4.2* Soil

- Surface Soil (to a depth of 2 feet)--During the original RI fieldwork, seven surface soil samples were collected from this site and analyzed for TAL inorganics, TCL VOAs, TCL BNAs, TCL pesticides/polychlorinated biphenyls (PCBs), explosives, and nitrite/nitrate. One additional surface soil sample was collected during the followup fieldwork; it was analyzed for TAL metals and TCL pesticides/PCBs. The occurrence and distribution of analytes detected in these samples are presented in Table 3-10*, and the contaminant selection rationale is summarized in Table 3-3*.

  Fourteen of the 23 inorganics detected (Table 3-10*), and nitrite/nitrate, are selected as contaminants of concern, because detected concentrations exceeded background levels in at least one sample. The two detected TCL VOAs--acetone and trichlorofluoromethane--are not selected as contaminants of concern, because they are common laboratory contaminants, they were detected in laboratory blanks at concentrations comparable to site samples, and the detected concentrations were low.

TABLE 3–10*

Occurrence and Distribution of Analytes Detected in Surface Soil (to a depth of 2 feet) at Site 47

COMPOUND	UNITS	Frequency of Detection	Percent Positive Detections	Range of Sample Detection Limits	Range of Detected Concentrations	Upper 95 Percent Confidence Limit (a)	Location of Max. Conc.	Comparison Criteria Concentration	Comparison Criteria Type	Number of Exceedances
TAL Inorganics										
ALUMINUM	UGG	8/8	100	DLNA	2410 – 5500	5105	S47A004	8604	Bkgd	0
ANTIMONY	UGG	2/8	25	3.8	184 – 336	151	S47A003	3.8	Bkgd	2
ARSENIC	UGG	8/8	100	DLNA	0.852 – 1.98	1.81	S47A001	5.24	Bkgd	0
BARIUM	UGG	8/8	100	DLNA	106 – 830	470	S47A003	233	Bkgd	2
BERYLLIUM	UGG	1/8	13	1.86	0.576	0.576(c)	S47B006	1.86	Bkgd	0
CADMIUM	UGG	2/8	25	3.05	30 – 49	23.3	S47A003	3.05	Bkgd	2
CALCIUM	UGG	8/8	100	DLNA	4980 – 150000	73240	S47A003	29006	Bkgd	2
CHROMIUM	UGG	2/8	25	12.7	51.8 – 78.9	40	S47A003	32.7	Bkgd	2
COBALT	UGG	1/8	13	15	4.24	4.24(c)	S47B006	15	Bkgd	0
COPPER	UGG	2/8	25	58.6	352 – 530	264	S47A003	58.6	Bkgd	2
IRON	UGG	8/8	100	DLNA	9540 – 20000	18468	S47A003	26233	Bkgd	0
LEAD	UGG	8/8	100	DLNA	4.58 – 920	428	S47A003	8.37	Bkgd	5
MAGNESIUM	UGG	8/8	100	DLNA	3280 – 29000	15950	S47A003	8585	Bkgd	2
MANGANESE	UGG	8/8	100	DLNA	135 – 424	424(c)	S47A004	874	Bkgd	0
MERCURY	UGG	7/8	88	0.05	0.065 – 0.91	0.559	S47A003	0.056	Bkgd	7
NICKEL	UGG	3/8	38	12.6	37.4 – 85.8	47.1	S47A003	12.6	Bkgd	3
POTASSIUM	UGG	8/8	100	DLNA	298 – 1650	1430	S47A005	2179	Bkgd	0
SELENIUM	UGG	2/8	25	0.25	0.366 – 0.37	0.261	S47A003	0.25	Bkgd	2
SILVER	UGG	3/8	38	0.025	0.061 – 1.2	0.638	S47B006	0.038	Bkgd	3
SODIUM	UGG	8/8	100	DLNA	335 – 1580	927	S47A003	978	Bkgd	2
THALLIUM	UGG	1/8	13	31.3	12.7	12.7(c)	S47B006	31.3	Bkgd	0
VANADIUM	UGG	8/8	100	DLNA	34.7 – 82	77.7	S47A003	131	Bkgd	0
ZINC	UGG	6/8	75	30.2	67.2 – 1990	961	S47A003	94	Bkgd	4
TCL Volatiles										
ACETONE	UGG	1/7	14	0.017	0.145	0.066	S47A003		NSA	NA
TRICHLOROFLUOROMETHANE	UGG	2/7	29	0.006	0.006 – 0.03	0.015	S47A003		NSA	NA
TCL Semivolatiles										
BENZO [A] ANTHRACENE	UGG	1/7	14	0.17 – 8.5	0.249	0.249(c)	S47A005		NSA	NA
BENZO [B] FLUORANTHENE	UGG	2/7	29	0.21 – 10.5	0.375 – 0.449	0.449(c)	S47A005		NSA	NA
BENZO [K] FLUORANTHENE	UGG	2/7	29	0.066 – 3.3	0.169 – 0.23	0.23(c)	S47A005		NSA	NA
CHRYSENE	UGG	2/7	29	0.12 – 6	0.461 – 0.481	0.481(c)	S47A005		NSA	NA
DI–N–BUTYL PHTHALATE	UGG	1/7	14	0.061 – 3.05	0.862	0.813	S47A003		NSA	NA
FLUORANTHENE	UGG	2/7	29	0.068 – 3.4	0.292 – 0.294	0.294(c)	S47A005		NSA	NA

TABLE 3-10* (cont'd)
Occurrence and Distribution of Analytes Detected in Surface Soil (to a depth of 2 feet) at Site 47

COMPOUND	UNITS	Frequency of Detection	Percent Positive Detections	Range of Sample Detection Limits	Range of Detected Concentrations	Upper 95 Percent Confidence Limit (a)	Location of Max. Conc.	Comparison Criteria Concentration	Comparison Criteria Type	Number of Exceedances
TCL Semivolatiles										
PHENANTHRENE	UGG	2/7	29	0.033 – 1.65	0.052 – 0.093	0.093(c)	S47A005		NSA	NA
PYRENE	UGG	2/7	29	0.033 – 1.65	0.31 – 0.325	0.325(c)	S47A005		NSA	NA
TCL Semivolatile TICs										
1-METHYLPYRENE	UGG	1/1	100	DLNA	0.203	0.203(b)	S47A005		NSA	NA
CYCLOHEXENE OXIDE	UGG	2/2	100	DLNA	0.081 – 0.092	0.092(c)	S47A005		NSA	NA
STYRENE	UGG	1/1	100	DLNA	3.02	3.02(b)	S47A003		NSA	NA
TCL Pesticides/PCBs										
CHLORDANE	UGG	1/7	14	0.018	0.708	0.303	S47A003		NSA	NA
DDD	UGG	2/8	25	0.008 – 0.01	0.254 – 0.36	0.176	S47B006		NSA	NA
DDE	UGG	2/8	25	0.008 – 0.01	0.01	0.007	S47A003		NSA	NA
DDT	UGG	3/8	38	0.007 – 0.01	0.06 – 0.108	0.067	S47A003		NSA	NA
DIELDRIN	UGG	1/8	13	0.006 – 0.01	0.014	0.007	S47B006		NSA	NA
PCB-1260	UGG	1/8	13	0.08 – 0.8	0.703	0.336	S47A003		NSA	NA
TCL Pesticides/PCB TICs										
alpha-CHLORDANE	UGG	1/1	100	DLNA	17.3	17.3(b)	S47B006		NSA	NA
gamma-CHLORDANE	UGG	1/1	100	DLNA	31.2	31.2(b)	S47B006		NSA	NA
Other Inorganics										
NITRATE/NITRITE	UGG	5/7	71	0.6	1.57 – 38	18.6	S47A003	9.9	Bkgd	2

(a) – Upper 95 percent confidence limit on the arithmetic mean. Calculated assuming one-half the detection level as the concentration for those samples in which a given analyte was not detected.
(b) – Since the frequency of detection for this chemical is 1/1, the concentration presented is not the 95 percent upper confidence limit, but the concentration detected in the sole sample collected.
(c) – The 95 percent upper confidence limit on the arithmetic mean exceeds the maximum detected concentration; therefore, the maximum detected value is presented (USEPA, 1989b).
– Contaminant of concern
Bkgd – The maximum detected concentration in UMDA background soils (see Section 3.1).
DLNA – Detection level not available. The detection levels could not be ascertained because constituents were detected in all relevant samples.
NA – Not applicable.
NSA – No standard for comparison available.
TAL – Target analyte list.
TCL – Target compound list.
TIC – Tentatively identified compound.
UGG – ug/g
* Replaces original TABLE 3-10 in the Final Baseline RA; Dames & Moore, 1992a.

Eight TCL BNAs were detected and are selected as contaminants of concern. Three semivolatile TICs (Table 3-10*) were also detected, but they are not selected as contaminants of concern. Five TCL pesticides and PCB 1260 were detected and are selected as contaminants of concern. Two TCL pesticide TICs (Table 3-10*) were detected, but they are not selected as contaminants of concern.

- Surface and Subsurface Soil (to a depth of 10 feet)--During the original RI fieldwork, 14 soil samples were collected from this depth interval and analyzed for TAL inorganics, TCL VOAs, TCL BNAs, TCL pesticides/PCBs, explosives, and nitrite/nitrate. One additional sample was collected from this depth range during the followup fieldwork; it was analyzed for TAL metals and TCL pesticides/PCBs. The occurrence and distribution of analytes detected in these samples are presented in Table 3-11*, and the contaminant selection rationale is summarized in Table 3-3*.

  Fourteen of the 23 TAL inorganics detected (Table 3-11*), and nitrite/nitrate, are selected as contaminants of concern, because detected concentrations exceeded background levels.

  The two TCL VOAs detected--acetone and trichlorotrifluoromethane--are not selected as contaminants of concern, because they are common laboratory contaminants, they were detected in laboratory blanks at concentrations comparable to site samples, and the detected concentrations were low.

  Eight TCL BNAs were detected and are selected as contaminants of concern. Five semivolatile TICs (Table 3-11*) were also detected, but they are not selected as contaminants of concern. Five TCL pesticides and PCB 1260 were detected and are selected as contaminants of concern. Two TCL pesticide TICs were detected, but they are not selected as contaminants of concern.

TABLE 3-11*

Occurrence and Distribution of Analytes Detected in Surface and Subsurface Soil (to a depth of 10 feet) at Site 47

COMPOUND	UNITS	Frequency of Detection	Percent Positive Detections	Range of Sample Detection Limits	Range of Detected Concentrations	Upper 95 Percent Confidence Limit (a)	Location of Max. Conc.	Comparison Criteria Concentration	Comparison Criteria Type	Number of Exceedances
TAL Inorganics										
ALUMINUM	UGG	15/15	100	DLNA	1940 – 5600	4832	S47A005	8604	Bkgd	0
ANTIMONY	UGG	2/15	13	3.8	184 – 336	79.6	S47A003	3.8	Bkgd	2
ARSENIC	UGG	15/15	100	DLNA	0.852 – 2.53	1.83	S47A001	5.24	Bkgd	0
BARIUM	UGG	15/15	100	DLNA	95 – 830	300	S47A003	233	Bkgd	2
BERYLLIUM	UGG	1/15	7	1.86	0.576	0.576(c)	S47B006	1.86	Bkgd	0
CADMIUM	UGG	2/15	13	3.05	30 – 49	12.9	S47A003	3.05	Bkgd	2
CALCIUM	UGG	15/15	100	DLNA	4970 – 150000	41094	S47A003	29006	Bkgd	2
CHROMIUM	UGG	2/15	13	12.7	51.8 – 78.9	23.9	S47A003	32.7	Bkgd	2
COBALT	UGG	1/15	7	15	4.24	4.24(c)	S47B006	15	Bkgd	0
COPPER	UGG	2/15	13	58.6	352 – 530	152	S47A003	58.6	Bkgd	2
IRON	UGG	15/15	100	DLNA	8300 – 20000	17087	S47A003	26233	Bkgd	0
LEAD	UGG	15/15	100	DLNA	2.19 – 920	227	S47A003	8.37	Bkgd	5
MAGNESIUM	UGG	15/15	100	DLNA	2290 – 29000	10424	S47A003	8585	Bkgd	2
MANGANESE	UGG	15/15	100	DLNA	135 – 462	414	S47A001	874	Bkgd	0
MERCURY	UGG	9/15	60	0.05	0.065 – 0.91	0.37	S47A003	0.056	Bkgd	9
NICKEL	UGG	3/15	20	12.6	37.4 – 85.8	28	S47A003	12.6	Bkgd	3
POTASSIUM	UGG	15/15	100	DLNA	298 – 1650	1265	S47A005	2179	Bkgd	0
SELENIUM	UGG	2/15	13	0.25	0.366 – 0.37	0.196	S47A003	0.25	Bkgd	2
SILVER	UGG	3/15	20	0.025	0.061 – 1.2	0.341	S47B006	0.038	Bkgd	3
SODIUM	UGG	15/15	100	DLNA	335 – 1580	724	S47A003	978	Bkgd	2
THALLIUM	UGG	1/15	7	31.3	12.7	12.7(c)	S47B006	31.3	Bkgd	0
VANADIUM	UGG	15/15	100	DLNA	34.7 – 82	68.8	S47A003	131	Bkgd	0
ZINC	UGG	10/15	67	30.2	55.2 – 1990	527	S47A003	94	Bkgd	4
TCL Volatiles										
ACETONE	UGG	1/14	7	0.017	0.145	0.036	S47A003		NSA	NA
TRICHLOROFLUOROMETHANE	UGG	2/14	14	0.006	0.006 – 0.03	0.009	S47A003		NSA	NA
TCL Semivolatiles										
BENZO [A] ANTHRACENE	UGG	1/14	7	0.17 – 8.5	0.249	0.249(c)	S47A005		NSA	NA
BENZO [B] FLUORANTHENE	UGG	2/14	14	0.21 – 10.5	0.375 – 0.449	0.449(c)	S47A005		NSA	NA
BENZO [K] FLUORANTHENE	UGG	2/14	14	0.066 – 3.3	0.169 – 0.23	0.23(c)	S47A005		NSA	NA
CHRYSENE	UGG	3/14	21	0.12 – 6	0.162 – 0.481	0.481(c)	S47A005		NSA	NA
DI-N-BUTYL PHTHALATE	UGG	1/14	7	0.061 – 3.05	0.862	0.421	S47A003		NSA	NA
FLUORANTHENE	UGG	3/14	21	0.068 – 3.4	0.094 – 0.294	0.294(c)	S47A005		NSA	NA

TABLE 3-11* (cont'd)

Occurrence and Distribution of Analytes Detected in Surface and Subsurface Soil (to a depth of 10 feet) at Site 47

COMPOUND	UNITS	Frequency of Detection	Percent Positive Detections	Range of Sample Detection Limits	Range of Detected Concentrations	Upper 95 Percent Confidence Limit (a)	Location of Max. Conc.	Comparison Criteria Concentration	Comparison Criteria Type	Number of Exceedances
TCL Semivolatiles										
PHENANTHRENE	UGG	2/14	14	0.033 – 1.65	0.052 – 0.093	0.093(c)	S47A005		NSA	NA
PYRENE	UGG	3/14	21	0.033 – 1.65	0.096 – 0.325	0.249	S47A005		NSA	NA
TCL Semivolatile TICs										
1-METHYLPYRENE	UGG	1/1	100	DLNA	0.203	0.203(b)	S47A005		NSA	NA
2-CYCLOHEXEN-1-OL	UGG	1/1	100	DLNA	0.205	0.205(b)	S47A001		NSA	NA
2-ETHYHEXANOL	UGG	1/1	100	DLNA	0.104	0.104(b)	S47A001		NSA	NA
CYCLOHEXENE OXIDE	UGG	3/3	100	DLNA	0.081 – 0.102	0.102(c)	S47A005		NSA	NA
STYRENE	UGG	1/1	100	DLNA	3.02	3.02(b)	S47A003		NSA	NA
TCL Pesticides/PCBs										
CHLORDANE	UGG	1/14	7	0.018	0.708	0.147	S47A003		NSA	NA
DDD	UGG	2/15	13	0.008 – 0.01	0.254 – 0.36	0.094	S47B006		NSA	NA
DDE	UGG	2/15	13	0.008 – 0.01	0.01	0.006	S47A003		NSA	NA
DDT	UGG	3/15	20	0.007 – 0.01	0.06 – 0.108	0.038	S47A003		NSA	NA
DIELDRIN	UGG	1/15	7	0.006 – 0.01	0.014	0.006	S47B006		NSA	NA
PCB-1260	UGG	1/15	7	0.08 – 0.8	0.703	0.194	S47A003		NSA	NA
TCL Pesticides/PCB TICs										
alpha-CHLORDANE	UGG	1/1	100	DLNA	17.3	17.3(b)	S47B006		NSA	NA
gamma-CHLORDANE	UGG	1/1	100	DLNA	31.2	31.2(b)	S47B006		NSA	NA
Other Inorganics										
NITRATE/NITRITE	UGG	10/14	71	0.6	0.902 – 38	10.3	S47A003	9.9	Bkgd	2

(a) – Upper 95 percent confidence limit on the arithmetic mean. Calculated assuming one-half the detection level as the concentration for those samples in which a given analyte was not detected.
(b) – Since the frequency of detection for this chemical is 1/1, the concentration presented is not the 95 percent upper confidence limit, but the concentration detected in the sole sample collected.
(c) – The 95 percent upper confidence limit on the arithmetic mean exceeds the maximum detected concentration; therefore, the maximum detected value is presented (USEPA, 1989b).
– Contaminant of concern
Bkgd – The maximum detected concentration in UMDA background soils (see Section 3.1).
DLNA – Detection level not available. The detection levels could not be ascertained because constituents were detected in all relevant samples.
NA – Not applicable.
NSA – No standard for comparison available.
TAL – Target analyte list.
TCL – Target compound list.
TIC – Tentatively identified compound.
UGG – ug/g
* Replaces original TABLE 3-11 in the Final Baseline RA; Dames & Moore, 1992a.

3.3 OPERABLE UNIT B: AMMUNITION DEMOLITION ACTIVITY AREA

3.3.5* Site 15: TNT Sludge Burial and Burn Area

3.3.5.1* Groundwater. No additional groundwater sampling was planned at Site 15; therefore, groundwater data for this site are not discussed in the addendum.

3.3.5.2* Soil

- Surface Soil (to a depth of 2 feet)--During the original RI fieldwork, four surface soil samples were collected from this site. Two of the samples were analyzed for TAL inorganics, TCL VOAs, TCL BNAs, explosives, and nitrite/nitrate; the remaining surface soil samples were analyzed for all of the above-listed parameters except nitrite/nitrate. During the followup fieldwork, eight additional surface soil samples were collected. These samples were analyzed for TAL metals, TCL BNAs, and explosives. The occurrence and distribution of contaminants detected in these samples are presented in Table 3-22*, and the contaminant selection rationale is summarized in Table 3-3*.

  Twenty of the 23 metals detected (Table 3-22*), and nitrite/nitrate, are selected as contaminants of concern, because detected concentrations exceeded background levels. Six explosives--two of which (2,4-DNT and 2,6-DNT) were detected as BNAs--were detected in Site 15 soil samples and are selected as contaminants of concern.

  Two VOAs and one additional BNA--all common laboratory contaminants--were detected in one sample each (Table 3-22*). Although they were not detected in method blanks associated with the sample set, they do not appear to be site-related chemicals based on site history information, they were generally detected in other laboratory blanks at similar concentrations, and the levels detected were low. Therefore, they are not included as contaminants of concern for this site.

TABLE 3–22*

Occurrence and Distribution of Analytes Detected in Surface Soil (to a depth of 2 feet) at Site 15

COMPOUND	UNITS	Frequency of Detection	Percent Positive Detections	Range of Sample Detection Limits	Range of Detected Concentrations	Upper 95 Percent Confidence Limit (a)	Location of Max. Conc.	Comparison Criteria Concentration	Comparison Criteria Type	Number of Exceedances
TAL Inorganics										
ALUMINUM	UGG	12/12	100	DLNA	3640 – 6200	5536	S15A004	8604	Bkgd	0
ANTIMONY	UGG	3/12	25	3.8 – 7.14	8.97 – 4050	947	S15A001	3.8	Bkgd	3
ARSENIC	UGG	12/12	100	DLNA	2.19 – 20	9.01	S15A001	5.24	Bkgd	2
BARIUM	UGG	10/12	83	300 – 3000	99 – 9100	2335	S15A004	233	Bkgd	2
BERYLLIUM	UGG	10/12	83	1.86	0.825 – 14.5	4.52	S15A004	1.86	Bkgd	2
CADMIUM	UGG	3/12	25	0.7 – 3.05	6.09 – 3500	817	S15A001	3.05	Bkgd	3
CALCIUM	UGG	12/12	100	DLNA	6310 – 26000	16246	S15A003	29006	Bkgd	0
CHROMIUM	UGG	11/12	92	12.7	7.15 – 8460	2042	S15A001	32.7	Bkgd	2
COBALT	UGG	10/12	83	15	7.33 – 252	78.3	S15A001	15	Bkgd	2
COPPER	UGG	11/12	92	58.6	9.58 – 3120	1035	S15A001	58.6	Bkgd	3
IRON	UGG	12/12	100	DLNA	15900 – 130000	54140	S15A004	26233	Bkgd	3
LEAD	UGG	12/12	100	DLNA	4.61 – 1100	401	S15B009	8.37	Bkgd	9
MAGNESIUM	UGG	12/12	100	DLNA	3720 – 17000	8143	S15A004	8585	Bkgd	2
MANGANESE	UGG	12/12	100	DLNA	354 – 1990	866	S15A004	874	Bkgd	2
MERCURY	UGG	1/12	8	0.05	0.235	0.074	S15A002	0.056	Bkgd	1
NICKEL	UGG	11/12	92	12.6	9.05 – 337	102	S15A004	12.6	Bkgd	3
POTASSIUM	UGG	12/12	100	DLNA	977 – 4140	2003	S15A001	2179	Bkgd	1
SELENIUM	UGG	2/12	17	0.25	0.701 – 6.57	1.67	S15A002	0.25	Bkgd	2
SILVER	UGG	6/12	50	0.025	0.032 – 2.4	0.676	S15A004	0.038	Bkgd	4
SODIUM	UGG	12/12	100	DLNA	228 – 2280	861	S15A001	978	Bkgd	2
THALLIUM	UGG	2/12	17	6.62 – 31.3	253 – 802	214	S15A004	31.3	Bkgd	2
VANADIUM	UGG	12/12	100	DLNA	37.8 – 89.9	63.9	S15A001	131	Bkgd	0
ZINC	UGG	12/12	100	DLNA	39.5 – 23000	7482	S15A001	94	Bkgd	6
Explosives										
135TNB	UGG	2/12	17	0.488	1.65 – 11.3	2.93	S15B009		NSA	NA
246TNT	UGG	2/12	17	0.456	210 – 300	95.1	S15B009		NSA	NA
HMX	UGG	6/12	50	0.666	0.688 – 34	11.1	S15A003		NSA	NA
RDX	UGG	7/12	58	0.587	0.857 – 150	48	S15A003		NSA	NA

TABLE 3–22* (cont'd)

Occurrence and Distribution of Analytes Detected in Surface Soil (to a depth of 2 feet) at Site 15

COMPOUND	UNITS	Frequency of Detection	Percent Positive Detections	Range of Sample Detection Limits	Range of Detected Concentrations	Upper 95 Percent Confidence Limit (a)	Location of Max. Conc.	Comparison Criteria Concentration	Comparison Criteria Type	Number of Exceedances
TCL Volatiles										
ACETONE	UGG	1/4	25	0.017	0.097	0.083	S15A001		NSA	NA
TRICHLOROFLUOROMETHANE	UGG	1/4	25	0.006	0.009	0.008	S15A001		NSA	NA
TCL Semivolatiles										
24DNT	UGG	1/12	8	0.14	6.2	1.5	S15B011		NSA	NA
26DNT	UGG	1/12	8	0.085	0.34	0.112	S15B011		NSA	NA
BIS(2–ETHYLHEXYL) PHTHALATE	UGG	1/12	8	0.62	0.724	0.406	S15A001		NSA	NA
TCL Semivolatile TICs										
1,3–DIPHENYLPROPANE	UGG	1/1	100	DLNA	0.112	0.112(b)	S15A001		NSA	NA
2–CYCLOHEXEN–1–OL	UGG	2/2	100	DLNA	0.23 – 0.448	0.448(c)	S15A001		NSA	NA
2–CYCLOHEXEN–ONE	UGG	2/2	100	DLNA	0.23 – 0.336	0.336(c)	S15A001		NSA	NA
CYCLOHEXENE OXIDE	UGG	2/2	100	DLNA	0.574 – 0.896	0.896(c)	S15A001		NSA	NA
HEXAMETHYLENE TETRAMINE	UGG	3/3	100	DLNA	0.42 – 3.21	3.21(c)	S15A003		NSA	NA
Other Inorganics										
NITRATE/NITRITE	UGG	2/2	100	DLNA	5 – 81	81(c)	S15A001	9.9	Bkgd	1

(a) – Upper 95 percent confidence limit on the arithmetic mean. Calculated assuming one–half the detection level as the concentration for those samples in which a given analyte was not detected.
(b) – Since the frequency of detection for this chemical is 1/1, the concentration presented is not the 95 percent upper confidence limit, but the concentration detected in the sole sample collected.
(c) – The 95 percent upper confidence limit on the arithmetic mean exceeds the maximum detected concentration; therefore, the maximum detected value is presented (USEPA, 1989b).
(shaded) – Contaminant of concern.
Bkgd – The maximum detected concentration in UMDA background soils (see Section 3.1).
DLNA – Detection level not available. The detection levels could not be ascertained because constituents were detected in all relevant samples.
NA – Not applicable.
NSA – No standard for comparison available.
TAL – Target analyte list.
TCL – Target compound list.
TIC – Tentatively identified compound.
UGG – ug/g

* Replaces original TABLE 3–22 in the Final Baseline RA; Dames & Moore, 1992a.

Five semivolatile TICs were also detected in Site 15 soil samples, but they are not selected as contaminants of concern.

- Surface and Subsurface Soil (to a depth of 10 feet)--During the original RI fieldwork, 14 soil samples were collected from this depth interval. Analytes for most soil samples consisted of TAL inorganics, TCL VOAs, TCL BNAs, explosives, and nitrite/nitrate. During the followup fieldwork, eight additional soil samples were collected from this depth range. These samples were analyzed for TAL metals, TCL BNAs, and explosives. The occurrence and distribution of contaminants detected in these samples are presented in Table 3-23*, and the contaminant selection rationale is summarized in Table 3-3*.

  All of the 23 metals detected (Table 3-23*), plus nitrite/nitrate, are selected as contaminants of concern, because detected concentrations exceeded background levels in at least one sample. Six explosives--two of which (2,4-DNT and 2,6-DNT) were detected as BNAs--were detected and are selected as contaminants of concern.

  Four VOAs and three additional BNAs were detected in one to two samples each (Table 3-23*). Acetone, toluene, and trichlorofluoromethane are common laboratory contaminants. Although they were not detected in method blanks associated with the sample set, they were generally detected in other laboratory blanks at similar concentrations, and the levels detected in site soil were low. Therefore, they are not included as contaminants of concern for this site. Bis(2-ethylhexyl) phthalate, trichloroethylene, naphthalene, and phenanthrene are selected as contaminants of concern.

  Seven semivolatile TICs were also detected in Site 15 soil samples in this depth range, but they are not selected as contaminants of concern.

TABLE 3–23*

Occurrence and Distribution of Analytes Detected in Surface and Subsurface Soil (to a depth of 10 feet) at Site 15

COMPOUND	UNITS	Frequency of Detection	Percent Positive Detections	Range of Sample Detection Limits	Range of Detected Concentrations	Upper 95 Percent Confidence Limit (a)	Location of Max. Conc.	Comparison Criteria Concentration	Comparison Criteria Type	Number of Exceedances
TAL Inorganics										
ALUMINUM	UGG	22/22	100	DLNA	3640 – 14000	6592	S15A001	8604	Bkgd	1
ANTIMONY	UGG	4/22	18	3.8 – 7.14	8.97 – 4050	523	S15A001	3.8	Bkgd	4
ARSENIC	UGG	22/22	100	DLNA	2.19 – 22	7.76	S15A001	5.24	Bkgd	3
BARIUM	UGG	19/22	86	300 – 3000	99 – 9100	1383	S15A004	233	Bkgd	3
BERYLLIUM	UGG	11/22	50	1.86	0.825 – 14.5	3.52	S15A004	1.86	Bkgd	3
CADMIUM	UGG	5/22	23	0.7 – 3.05	6.09 – 3500	669	S15A001	3.05	Bkgd	5
CALCIUM	UGG	22/22	100	DLNA	6310 – 34000	20119	S15A004	29006	Bkgd	2
CHROMIUM	UGG	14/22	64	12.7	7.15 – 8460	1224	S15A001	32.7	Bkgd	5
COBALT	UGG	12/22	55	15	7.33 – 252	53.9	S15A001	15	Bkgd	4
COPPER	UGG	12/22	55	58.6	9.58 – 3120	600	S15A001	58.6	Bkgd	4
IRON	UGG	22/22	100	DLNA	15000 – 130000	46585	S15A001	26233	Bkgd	5
LEAD	UGG	22/22	100	DLNA	3.69 – 1100	240	S15B009	8.37	Bkgd	13
MAGNESIUM	UGG	22/22	100	DLNA	3720 – 17000	8325	S15A004	8585	Bkgd	4
MANGANESE	UGG	22/22	100	DLNA	354 – 1990	830	S15A004	874	Bkgd	4
MERCURY	UGG	2/22	9	0.05	0.08 – 0.235	0.054	S15A002	0.056	Bkgd	2
NICKEL	UGG	12/22	55	12.6	9.05 – 337	69.4	S15A004	12.6	Bkgd	4
POTASSIUM	UGG	22/22	100	DLNA	977 – 4140	1808	S15A001	2179	Bkgd	3
SELENIUM	UGG	3/22	14	0.25	0.701 – 6.57	1.09	S15A002	0.25	Bkgd	3
SILVER	UGG	9/22	41	0.025	0.032 – 2.4	0.499	S15A004	0.038	Bkgd	6
SODIUM	UGG	22/22	100	DLNA	228 – 2280	848	S15A001	978	Bkgd	3
THALLIUM	UGG	3/22	14	6.62 – 31.3	253 – 802	161	S15A004	31.3	Bkgd	3
VANADIUM	UGG	22/22	100	DLNA	37.8 – 170	81.7	S15A001	131	Bkgd	1
ZINC	UGG	22/22	100	DLNA	39.5 – 23000	4656	S15A001	94	Bkgd	10
Explosives										
135TNB	UGG	3/22	14	0.488	0.589 – 11.3	1.69	S15B009		NSA	NA
246TNT	UGG	3/22	14	0.456	80 – 300	55.3	S15B009		NSA	NA
HMX	UGG	8/22	36	0.666	0.688 – 34	6.7	S15A003		NSA	NA
RDX	UGG	13/22	59	0.587	0.704 – 150	29.2	S15A003		NSA	NA

TABLE 3-23* (cont'd)

Occurrence and Distribution of Analytes Detected in Surface and Subsurface Soil (to a depth of 10 feet) at Site 15

COMPOUND	UNITS	Frequency of Detection	Percent Positive Detections	Range of Sample Detection Limits	Range of Detected Concentrations	Upper 95 Percent Confidence Limit (a)	Location of Max. Conc.	Comparison Criteria Concentration	Comparison Criteria Type	Number of Exceedances
TCL Volatiles										
ACETONE	UGG	1/12	8	0.017	0.097	0.029	S15A001		NSA	NA
TOLUENE	UGG	1/12	8	0.001	0.003	0.001	S15A001		NSA	NA
TRICHLOROETHYLENE	UGG	1/12	8	0.003	0.004	0.002	S15A001		NSA	NA
TRICHLOROFLUOROMETHANE	UGG	1/12	8	0.006	0.009	0.004	S15A001		NSA	NA
TCL Semivolatiles										
24DNT	UGG	1/22	5	0.14	6.2	0.828	S15B011		NSA	NA
26DNT	UGG	1/22	5	0.085	0.34	0.079	S15B011		NSA	NA
BIS(2-ETHYLHEXYL) PHTHALATE	UGG	2/22	9	0.62	0.724 - 89.9	11.4	S15A001		NSA	NA
NAPHTHALENE	UGG	1/22	5	0.037	0.089	0.027	S15A001		NSA	NA
PHENANTHRENE	UGG	1/22	5	0.033	0.045	0.02	S15A001		NSA	NA
TCL Semivolatile TICs										
1,3-DIPHENYLPROPANE	UGG	1/1	100	DLNA	0.112	0.112(b)	S15A001		NSA	NA
2-CYCLOHEXEN-1-OL	UGG	6/6	100	DLNA	0.23 - 0.448	0.376	S15A001		NSA	NA
2-CYCLOHEXEN-ONE	UGG	5/5	100	DLNA	0.21 - 0.378	0.36	S15A001		NSA	NA
CYCLOHEXENE OXIDE	UGG	10/10	100	DLNA	0.208 - 1.01	0.79	S15A001		NSA	NA
HEXADECANOIC ACID	UGG	1/1	100	DLNA	0.656	0.656(b)	S15A001		NSA	NA
HEXAMETHYLENE TETRAMINE	UGG	4/4	100	DLNA	0.42 - 3.21	3.21(c)	S15A003		NSA	NA
OCTADECANOIC ACID	UGG	1/1	100	DLNA	0.438	0.438(b)	S15A001		NSA	NA
Other Inorganics										
NITRATE/NITRITE	UGG	5/10	50	0.6	3.08 - 81	26.9	S15A001	9.9	Bkgd	2

(a) – Upper 95 percent confidence limit on the arithmetic mean. Calculated assuming one-half the detection level as the concentration for those samples in which a given analyte was not detected.
(b) – Since the frequency of detection for this chemical is 1/1, the concentration presented is not the 95 percent upper confidence limit, but the concentration detected in the sole sample collected.
(c) – The 95 percent upper confidence limit on the arithmetic mean exceeds the maximum detected concentration; therefore, the maximum detected value is presented (USEPA, 1989b).
– Contaminant of concern
Bkgd – The maximum detected concentration in UMDA background soils (see Section 3.1).
DLNA – Detection level not available. The detection levels could not be ascertained because constituents were detected in all relevant samples.
NA – Not applicable.
NSA – No standard for comparison available.
TAL – Target analyte list.
TCL – Target compound list.
TIC – Tentatively identified compound.
UGG – ug/g
* Replaces original TABLE 3-23 in the Final Baseline RA; Dames & Moore, 1992a.

3.3.7* Site 17: Aboveground Open Detonation Area

3.3.7.1* Groundwater. Contamination at Site 17--if any--is expected to be restricted to surficial soil. No groundwater sampling was planned for the RI or the followup fieldwork.

3.3.7.2* Soil. During the original RI fieldwork, four surface soil samples were collected at Site 17 at the detonation location and analyzed for explosives, TAL inorganics, and nitrite/nitrate. Three additional samples were collected during the followup fieldwork and analyzed for TAL metals and explosives. The occurrence and distribution of analytes detected in these samples are presented in Table 3-27*, and the contaminant selection rationale is summarized in Table 3-3*.

Eleven of the 21 TAL inorganics (Table 3-27*) are selected as contaminants of concern, because concentrations exceeded background levels. Sodium is not selected as a contaminant of concern, because the maximum detected concentration (1,001 micrograms per gram (μg/g)) only slightly exceeded the background level (978 μg/g). Three explosives were detected in Site 17 soil samples and are selected as contaminants of concern.

3.3.8* Site 18: Dunnage Pits

3.3.8.1* Groundwater. No additional groundwater sampling was planned at Site 18 during the followup fieldwork; therefore, groundwater data for this site are not discussed in the addendum.

3.3.8.2* Soil

- Surface Soil (to a depth of 2 feet)--Four surface soil samples were collected from this site during the original RI fieldwork and analyzed for TAL inorganics, TCL VOAs, TCL BNAs, TCL pesticides/ PCBs, explosives, and nitrite/nitrate. (Weston had previously collected four surface soil samples from Site 18 and analyzed for nitrite/nitrate, VOAs, BNAs, and pesticides.) During Dames & Moore's followup fieldwork, three additional surface soil samples were collected and analyzed for

TABLE 3–27*

Occurrence and Distribution of Analytes Detected in Surface Soil (to a depth of 2 feet) at Site 17

COMPOUND	UNITS	Frequency of Detection	Percent Positive Detections	Range of Sample Detection Limits	Range of Detected Concentrations	Upper 95 Percent Confidence Limit (a)	Location of Max. Conc.	Comparison Criteria Concentration	Comparison Criteria Type	Number of Exceedances
TAL Inorganics										
ALUMINUM	UGG	7/7	100	DLNA	4460 – 7157	5888	S17A004	8604	Bkgd	0
ANTIMONY	UGG	3/7	43	3.8 – 7.14	9.87 – 99.3	45.7	S17A001	3.8	Bkgd	3
ARSENIC	UGG	7/7	100	DLNA	1.33 – 2.71	2.37	S17B007	5.24	Bkgd	0
BARIUM	UGG	7/7	100	DLNA	94.2 – 152	126	S17A001	233	Bkgd	0
BERYLLIUM	UGG	4/7	57	1.86	0.927 – 3.4	2	S17A001	1.86	Bkgd	1
CADMIUM	UGG	1/7	14	0.7 – 3.05	5.97	3.12	S17A001	3.05	Bkgd	1
CALCIUM	UGG	7/7	100	DLNA	4997 – 14300	10311	S17B007	29006	Bkgd	0
CHROMIUM	UGG	3/7	43	12.7	5.97 – 8.14	7.06	S17B007	32.7	Bkgd	0
COBALT	UGG	4/7	57	15	7.63 – 26.8	15.8	S17A001	15	Bkgd	1
COPPER	UGG	4/7	57	58.6	10.6 – 351	167	S17A001	58.6	Bkgd	2
IRON	UGG	7/7	100	DLNA	17500 – 78253	44565	S17A001	26233	Bkgd	1
LEAD	UGG	7/7	100	DLNA	43.3 – 1647	837	S17A001	8.37	Bkgd	7
MAGNESIUM	UGG	7/7	100	DLNA	3480 – 5794	5138	S17A004	8585	Bkgd	0
MANGANESE	UGG	7/7	100	DLNA	308 – 680	527	S17A001	874	Bkgd	0
MERCURY	UGG	1/7	14	0.05	0.092	0.053	S17B006	0.056	Bkgd	1
NICKEL	UGG	4/7	57	12.6	7.65 – 31.1	17.6	S17A001	12.6	Bkgd	1
POTASSIUM	UGG	7/7	100	DLNA	1050 – 2082	1671	S17A001	2179	Bkgd	0
SILVER	UGG	5/7	71	0.025	0.035 – 0.151	0.066	S17A001	0.038	Bkgd	3
SODIUM	UGG	7/7	100	DLNA	287 – 1001	757	S17A003	978	Bkgd	1
VANADIUM	UGG	7/7	100	DLNA	37.5 – 113	104	S17A001	131	Bkgd	0
ZINC	UGG	7/7	100	DLNA	41.6 – 123	91.9	S17A001	94	Bkgd	1
Explosives										
246TNT	UGG	1/7	14	0.456	3.55	1.62	S17A001		NSA	NA
HMX	UGG	2/7	29	0.666	0.741 – 1.89	1.04	S17A001		NSA	NA
RDX	UGG	5/7	71	0.587	1.08 – 13.9	6.67	S17A001		NSA	NA
Other Inorganics										
NITRATE/NITRITE	UGG	4/4	100	DLNA	2.26 – 5.59	5.14	S17A001	9.9	Bkgd	0

(a) – Upper 95 percent confidence limit on the arithmetic mean. Calculated assuming one–half the detection level as the concentration for those samples in which a given analyte was not detected.
(b) – Since the frequency of detection for this chemical is 1/1, the concentration presented is not the 95 percent upper confidence limit, but the concentration detected in the sole sample collected.
(c) – The 95 percent upper confidence limit on the arithmetic mean exceeds the maximum detected concentration; therefore, the maximum detected value is presented (USEPA, 1989b).
[shaded] – Contaminant of concern
Bkgd – The maximum detected concentration in UMDA background soils (see Section 3.1).
DLNA – Detection level not available. The detection levels could not be ascertained because constituents were detected in all relevant samples.
NA – Not applicable.
NSA – No standard for comparison available.
TAL – Target analyte list.
TCL – Target compound list.
TIC – Tentatively identified compound.
UGG – ug/g
* Replaces original TABLE 3–27 in the Final Baseline RA; Dames & Moore, 1992a.

TAL metals, TCL VOAs, TCL BNAs, explosives, and TCL pesticides/PCBs. The occurrence and distribution of contaminants detected in these soil samples are presented in Table 3-29*, and the contaminant selection rationale is summarized in Table 3-3*.

Eleven of the 20 metals detected (Table 3-29*) are selected as contaminants of concern, because detected concentrations exceeded background levels in at least one sample.

One TCL VOA--1,1,1-trichloroethane--is selected as a contaminant of concern, because it is not considered a common laboratory contaminant.

Two additional TCL VOAs--acetone and trichlorofluoromethane, both common laboratory contaminants--were detected in one surface soil sample each. Although they were not detected in method blanks associated with the sample set, they do not appear to be site-related chemicals based on site history information, they were detected in other laboratory blanks at similar concentrations, and the levels detected were low. Therefore, acetone and trichlorofluoromethane are not selected as contaminants of concern for this site.

Two TCL BNAs--di-N-butyl phthalate and phenanthrene--were detected and are selected as contaminants of concern. Two TCL pesticides--DDE and DDT--were also detected and are selected as contaminants of concern.

Two TCL volatile TICs and three TCL semivolatile TICs (Table 3-29*) were also detected, but they are not selected as contaminants of concern.

- <u>Surface and Subsurface Soil (to a depth of 10 feet)</u>--Twenty-eight soil samples were collected from this depth interval during the original RI fieldwork and analyzed for TAL inorganics, TCL VOAs, TCL BNAs, TCL pesticides/PCBs, explosives, and nitrite/nitrate. (Weston had previously collected four surface soil samples from this site and analyzed

TABLE 3–29*

Occurrence and Distribution of Analytes Detected in Surface Soil (to a depth of 2 feet) at Site 18

COMPOUND	UNITS	Frequency of Detection	Percent Positive Detections	Range of Sample Detection Limits	Range of Detected Concentrations	Upper 95 Percent Confidence Limit (a)	Location of Max. Conc.	Comparison Criteria Concentration	Comparison Criteria Type	Number of Exceedances
TAL Inorganics										
ALUMINUM	UGG	7/7	100	DLNA	4940 – 34335	18093	S18A002	8604	Bkgd	1
ARSENIC	UGG	7/7	100	DLNA	2.85 – 6.6	4.82	S18A002	5.24	Bkgd	1
BARIUM	UGG	7/7	100	DLNA	97.1 – 510	309	S18A002	233	Bkgd	1
BERYLLIUM	UGG	3/7	43	1.86	1.1 – 1.28	1.13	S18B011	1.86	Bkgd	0
CADMIUM	UGG	2/7	29	0.7 – 3.05	2.85 – 3.46	2.57	S18B011	3.05	Bkgd	1
CALCIUM	UGG	7/7	100	DLNA	9460 – 17098	15724	S18A002	29006	Bkgd	0
CHROMIUM	UGG	4/7	57	12.7	8.1 – 94.9	45	S18A002	32.7	Bkgd	1
COBALT	UGG	3/7	43	15	7.55 – 8.06	7.75	S18B009	15	Bkgd	0
COPPER	UGG	4/7	57	58.6	15.7 – 114	64.7	S18A002	58.6	Bkgd	1
IRON	UGG	7/7	100	DLNA	16000 – 23729	20160	S18A002	26233	Bkgd	0
LEAD	UGG	7/7	100	DLNA	4.74 – 410	250	S18B011	8.37	Bkgd	4
MAGNESIUM	UGG	7/7	100	DLNA	3990 – 7100	6297	S18A001	8585	Bkgd	0
MANGANESE	UGG	7/7	100	DLNA	358 – 1820	1047	S18A001	874	Bkgd	1
NICKEL	UGG	4/7	57	12.6	8.82 – 463	199	S18A002	12.6	Bkgd	1
POTASSIUM	UGG	7/7	100	DLNA	987 – 2075	1815	S18A003	2179	Bkgd	0
SILVER	UGG	5/7	71	0.025	0.032 – 2	1.01	S18A002	0.038	Bkgd	4
SODIUM	UGG	7/7	100	DLNA	252 – 3556	1757	S18A002	978	Bkgd	1
THALLIUM	UGG	2/7	29	6.62 – 31.3	8.37 – 10.4	10.4(c)	S18B009	31.3	Bkgd	0
VANADIUM	UGG	7/7	100	DLNA	41.4 – 78.1	71.2	S18A003	131	Bkgd	0
ZINC	UGG	7/7	100	DLNA	59 – 2172	978	S18A002	94	Bkgd	5
TCL Volatiles										
1,1,1–TRICHLOROETHANE	UGG	1/11	9	0.004 – 0.05	0.007	0.007(c)	S18B009		NSA	NA
ACETONE	UGG	1/7	14	0.017	0.078	0.038	S18B011		NSA	NA
TRICHLOROFLUOROMETHANE	UGG	1/7	14	0.006	0.03	0.014	S18A002		NSA	NA
TCL Volatile TICs										
ACETIC ACID, ETHYL ESTER	UGG	1/1	100	DLNA	0.2	0.2(b)	S18B011		NSA	NA
ETHANOL	UGG	1/1	100	DLNA	0.006	0.006(b)	S18B011		NSA	NA

TABLE 3–29* (cont'd)
Occurrence and Distribution of Analytes Detected in Surface Soil (to a depth of 2 feet) at Site 18

COMPOUND	UNITS	Frequency of Detection	Percent Positive Detections	Range of Sample Detection Limits	Range of Detected Concentrations	Upper 95 Percent Confidence Limit (a)	Location of Max. Conc.	Comparison Criteria Concentration	Comparison Criteria Type	Number of Exceedances
TCL Semivolatiles										
DI–N–BUTYL PHTHALATE	UGG	1/11	9	0.061 – 0.3	0.3	0.147	S18B011		NSA	NA
PHENANTHRENE	UGG	1/11	9	0.033 – 0.3	0.047	0.047(c)	S18B011		NSA	NA
TCL Semivolatile TICs										
2–CYCLOHEXEN–1–OL	UGG	2/2	100	DLNA	0.093 – 0.105	0.105(c)	S18A001		NSA	NA
2–CYCLOHEXEN–ONE	UGG	2/2	100	DLNA	0.093 – 0.105	0.105(c)	S18A001		NSA	NA
CYCLOHEXENE OXIDE	UGG	2/2	100	DLNA	0.31 – 0.421	0.421(c)	S18A001		NSA	NA
TCL Pesticides/PCBs										
DDE	UGG	1/7	14	0.008	0.008	0.006	S18B011		NSA	NA
DDT	UGG	2/7	29	0.007	0.009 – 0.01	0.007	S18B011		NSA	NA
Other Inorganics										
NITRATE/NITRITE	UGG	4/8	50	500	0.704 – 9.21	9.21(c)	S18A001	9.9	Bkgd	0

(a) – Upper 95 percent confidence limit on the arithmetic mean. Calculated assuming one–half the detection level as the concentration for those samples in which a given analyte was not detected.
(b) – Since the frequency of detection for this chemical is 1/1, the concentration presented is not the 95 percent upper confidence limit, but the concentration detected in the sole sample collected.
(c) – The 95 percent upper confidence limit on the arithmetic mean exceeds the maximum detected concentration; therefore, the maximum detected value is presented (USEPA, 1989b).
– Contaminant of concern
Bkgd – The maximum detected concentration in UMDA background soils (see Section 3.1).
DLNA – Detection level not available. The detection levels could not be ascertained because constituents were detected in all relevant samples.
NA – Not applicable.
NSA – No standard for comparison available.
TAL – Target analyte list.
TCL – Target compound list.
TIC – Tentatively identified compound.
UGG – ug/g
* Replaces original TABLE 3–29 in the Final Baseline RA; Dames & Moore, 1992a.

for nitrite/nitrate, VOAs, BNAs, and pesticides.) During the followup fieldwork, Dames & Moore collected 17 additional samples, two of which were analyzed only for TAL metals. The remaining 15 samples were analyzed for TAL metals, TCL VOAs, TCL BNAs, TCL pesticides/PCBs, and explosives. The occurrence and distribution of contaminants detected in all of these soil samples are presented in Table 3-30*, and the contaminant selection rationale is summarized in Table 3-3*.

Nineteen of the 22 metals detected (Table 3-30*) are selected as contaminants of concern, because detected concentrations exceeded background levels in at least one sample.

One TCL VOA--1,1,1-trichloroethane--is of concern, because it is not considered a common laboratory contaminant.

Three additional TCL VOAs (Table 3-30*)--all common laboratory contaminants--were detected. Although they were not detected in method blanks associated with the sample set, they do not appear to be site-related chemicals based on site history information, they were detected in other laboratory blanks at similar concentrations, and the levels detected were low. Therefore, they are not selected as contaminants of concern for this site. Three TCL BNAs (Table 3-30*) were detected and are selected as contaminants of concern.

Two TCL volatile TICs, 12 semivolatile TICs, and two PCB TICs were detected in Site 18 soil samples (Table 3-30*), but they are not selected as contaminants of concern. The PCBs were analyzed for but not detected as TCL PCBs, giving additional uncertainty to their identity as TICs. Three pesticides and one PCB were detected and are selected as contaminants of concern.

TABLE 3–30*

Occurrence and Distribution of Analytes Detected in Surface and Subsurface Soil (to a depth of 10 feet) at Site 18

COMPOUND	UNITS	Frequency of Detection	Percent Positive Detections	Range of Sample Detection Limits	Range of Detected Concentrations	Upper 95 Percent Confidence Limit (a)	Location of Max. Conc.	Comparison Criteria Concentration	Comparison Criteria Type	Number of Exceedances
TAL Inorganics										
ALUMINUM	UGG	45/45	100	DLNA	4029 – 60890	11149	S18A004	8604	Bkgd	10
ANTIMONY	UGG	3/45	7	3.8 – 7.14	10.3 – 20.8	4.06	S18B011	3.8	Bkgd	3
ARSENIC	UGG	45/45	100	DLNA	2.13 – 53	8	S18A004	5.24	Bkgd	10
BARIUM	UGG	45/45	100	DLNA	97.1 – 11232	1007	S18A005	233	Bkgd	10
BERYLLIUM	UGG	20/45	44	1.86	0.751 – 11.4	1.91	S18A005	1.86	Bkgd	3
CADMIUM	UGG	15/45	33	0.7 – 3.05	0.848 – 21.5	3	S18A005	3.05	Bkgd	6
CALCIUM	UGG	45/45	100	DLNA	8416 – 27765	17193	S18A006	29006	Bkgd	0
CHROMIUM	UGG	23/45	51	12.7	7.1 – 94.9	17.9	S18A002	32.7	Bkgd	4
COBALT	UGG	17/45	38	15	6.74 – 9.74	7.87	S18B009	15	Bkgd	0
COPPER	UGG	24/45	53	58.6	10.1 – 6540	476	S18A004	58.6	Bkgd	10
IRON	UGG	45/45	100	DLNA	14000 – 104515	29016	S18A005	26233	Bkgd	8
LEAD	UGG	45/45	100	DLNA	4.74 – 2600	359	S18B009	8.37	Bkgd	23
MAGNESIUM	UGG	45/45	100	DLNA	3340 – 9845	6483	S18A002	8585	Bkgd	4
MANGANESE	UGG	45/45	100	DLNA	357 – 1820	689	S18A001	874	Bkgd	4
NICKEL	UGG	24/45	53	12.6	8.45 – 463	43.6	S18A002	12.6	Bkgd	12
POTASSIUM	UGG	45/45	100	DLNA	727 – 2600	1637	S18A001	2179	Bkgd	5
SELENIUM	UGG	1/45	2	0.25	0.647	0.156	S18B011	0.25	Bkgd	1
SILVER	UGG	31/45	69	0.025	0.03 – 38	3.08	S18B009	0.038	Bkgd	23
SODIUM	UGG	45/45	100	DLNA	244 – 5214	1127	S18A004	978	Bkgd	8
THALLIUM	UGG	9/45	20	6.62 – 3130	8.37 – 14.3	14.3(c)	S18B011	31.3	Bkgd	0
VANADIUM	UGG	45/45	100	DLNA	28.4 – 134	69.6	S18A004	131	Bkgd	1
ZINC	UGG	45/45	100	DLNA	39.7 – 3842	708	S18A004	94	Bkgd	21
TCL Volatiles										
1,1,1–TRICHLOROETHANE	UGG	1/47	2	0.004 – 0.05	0.007	0.006	S18B009		NSA	NA
ACETONE	UGG	3/43	7	0.017	0.047 – 0.078	0.015	S18B011		NSA	NA
TOLUENE	UGG	2/47	4	0.001 – 0.05	0.002 – 0.003	0.003(c)	S18B011		NSA	NA
TRICHLOROFLUOROMETHANE	UGG	10/43	23	0.006	0.006 – 0.03	0.008	S18A002		NSA	NA

TABLE 3–30* (cont'd)
Occurrence and Distribution of Analytes Detected in Surface and Subsurface Soil (to a depth of 10 feet) at Site 18

COMPOUND	UNITS	Frequency of Detection	Percent Positive Detections	Range of Sample Detection Limits	Range of Detected Concentrations	Upper 95 Percent Confidence Limit (a)	Location of Max. Conc.	Comparison Criteria Concentration	Comparison Criteria Type	Number of Exceedances
TCL Volatile TICs										
ACETIC ACID, ETHYL ESTER	UGG	1/1	100	DLNA	0.2	0.2(b)	S18B011		NSA	NA
ETHANOL	UGG	1/1	100	DLNA	0.006	0.006(b)	S18B011		NSA	NA
TCL Semivolatiles										
DI–N–BUTYL PHTHALATE	UGG	2/47	4	0.061 – 0.3	0.16 – 0.3	0.062	S18B011		NSA	NA
NAPHTHALENE	UGG	2/47	4	0.037 – 0.3	0.051 – 0.056	0.04	S18B009		NSA	NA
PHENANTHRENE	UGG	1/47	2	0.033 – 0.3	0.047	0.038	S18B011		NSA	NA
TCL Semivolatile TICs										
2,6,10,14–TETRAMETHYLPENTADECANE	UGG	1/1	100	DLNA	0.636	0.636(b)	S18A004		NSA	NA
2–CYCLOHEXEN–1–OL	UGG	9/9	100	DLNA	0.093 – 0.234	0.191	S18A004		NSA	NA
2–CYCLOHEXEN–ONE	UGG	9/9	100	DLNA	0.093 – 0.117	0.11	S18A004		NSA	NA
CYCLOHEXENE OXIDE	UGG	8/8	100	DLNA	0.31 – 0.443	0.402	S18A001		NSA	NA
DIACETONE ALCOHOL	UGG	2/2	100	DLNA	0.105 – 0.82	0.82(c)	S18A004		NSA	NA
EICOSANE	UGG	1/1	100	DLNA	0.424	0.424(b)	S18A004		NSA	NA
HENEICOSANE	UGG	1/1	100	DLNA	0.212	0.212(b)	S18A004		NSA	NA
HEPTADECANE	UGG	1/1	100	DLNA	1.06	1.06(b)	S18A004		NSA	NA
HEXADECANE	UGG	1/1	100	DLNA	1.06	1.06(b)	S18A004		NSA	NA
NONADECANE	UGG	1/1	100	DLNA	0.742	0.742(b)	S18A004		NSA	NA
TETRADECANE	UGG	1/1	100	DLNA	0.318	0.318(b)	S18A004		NSA	NA
TOLUENE	UGG	1/1	100	DLNA	0.067	0.067(b)	S18A001		NSA	NA
TCL Pesticides/PCBs										
DDE	UGG	4/43	9	0.008	0.008 – 0.021	0.006	S18A004		NSA	NA
DDT	UGG	9/43	21	0.007	0.009 – 0.042	0.009	S18A004		NSA	NA
DIELDRIN	UGG	1/43	2	0.006	0.022	0.004	S18A005		NSA	NA
PCB–1260	UGG	1/43	2	0.08	0.168	0.048	S18B009		NSA	NA

TABLE 3–30* (cont'd)

Occurrence and Distribution of Analytes Detected in Surface and Subsurface Soil (to a depth of 10 feet) at Site 18

COMPOUND	UNITS	Frequency of Detection	Percent Positive Detections	Range of Sample Detection Limits	Range of Detected Concentrations	Upper 95 Percent Confidence Limit (a)	Location of Max. Conc.	Comparison Criteria Concentration	Comparison Criteria Type	Number of Exceedances
TCL Pesticides/PCB TICs										
PCB–1248	UGG	4/4	100	DLNA	0.186 – 2.23	2.23(c)	S18A004		NSA	NA
PCB–1254	UGG	1/1	100	DLNA	0.424	0.424(b)	S18A004		NSA	NA
Other Inorganics										
NITRATE/NITRITE	UGG	17/32	53	0.6 – 500	0.704 – 9.21	9.21(c)	S18A001	9.9	Bkgd	0

(a) – Upper 95 percent confidence limit on the arithmetic mean. Calculated assuming one–half the detection level as the concentration for those samples in which a given analyte was not detected.
(b) – Since the frequency of detection for this chemical is 1/1, the concentration presented is not the 95 percent upper confidence limit, but the concentration detected in the sole sample collected.
(c) – The 95 percent upper confidence limit on the arithmetic mean exceeds the maximum detected concentration; therefore, the maximum detected value is presented (USEPA, 1989b).
– Contaminant of concern
Bkgd – The maximum detected concentration in UMDA background soils (see Section 3.1).
DLNA – Detection level not available. The detection levels could not be ascertained because constituents were detected in all relevant samples.
NA – Not applicable.
NSA – No standard for comparison available.
TAL – Target analyte list.
TCL – Target compound list.
TIC – Tentatively identified compound.
UGG – ug/g
* Replaces original TABLE 3–30 in the Final Baseline RA; Dames & Moore, 1992a.

3.3.9* Site 19: Open Burning Trenches/Pads

3.3.9.1* Groundwater. During the original RI fieldwork, three flood gravel wells (19-1 through 19-3) were installed at Site 19 in addition to the three already existing monitoring wells (43, 44, and SB-4). Wells installed in conjunction with other sites were also evaluated to determine if they are downgradient of Site 19. A review of groundwater flow data indicates that wells 19-2, 19-3, and SB-4 appear to be downgradient of the site. Therefore, only results from these wells are considered in selecting groundwater contaminants of concern. Analytes consisted of TAL metals, TCL VOAs, TCL BNAs, explosives, and nitrite/nitrate. During the followup fieldwork, one new well (19-4) was installed at Site 19, and groundwater samples were collected from monitoring wells 19-2, 19-3, and 19-4. These samples were analyzed for explosives only. The occurrence and distribution of analytes detected in wells 19-2, 19-3, SB-4, and 19-4 are presented in Table 3-31*, and the contaminant selection rationale is summarized in Table 3-2*.

Eight of the 16 metals detected (Table 3-31*) are selected as contaminants of concern, because detected concentrations exceeded background levels. One explosive was detected and is selected as a contaminant of concern. Two TCL semivolatile TICs--octadecanoic acid and caprolactam--were detected in Site 19 groundwater samples, but they are not selected as contaminants of concern.

3.3.9.2* Soil

- Surface Soil (to a depth of 2 feet)--During the original RI fieldwork, four surface soil samples were collected at this site and analyzed for TAL inorganics, explosives, and nitrite/nitrate. During followup fieldwork, eight additional samples were collected and analyzed for TAL metals and explosives. The occurrence and distribution of analytes detected in these samples are presented in Table 3-32*, and the contaminant selection rationale is summarized in Table 3-3*.

TABLE 3–31*

Occurrence and Distribution of Analytes Detected in Groundwater at Site 19

COMPOUND	UNITS	Frequency of Detection	Percent Positive Detections	Range of Sample Detection Limits	Range of Detected Concentrations	Upper 95 Percent Confidence Limit (a)	Location of Max. Conc.	Comparison Criteria Concentration	Comparison Criteria Type	Number of Exceedances
TAL Inorganics										
ANTIMONY	UGL	2/7	29	3 – 3.03	3.21 – 41.3	18.4	19–3	1	Bkgd	2
ARSENIC	UGL	7/7	100	DLNA	11.5 – 18.2	18.2(c)	SB–4	1	Bkgd	7
BARIUM	UGL	6/6	100	DLNA	42.1 – 58.6	58.6(c)	19–2	59	Bkgd	0
BERYLLIUM	UGL	1/7	14	5	0.5	0.5(c)	SB–4		NSA	NA
CALCIUM	UGL	6/6	100	DLNA	36961 – 47228	45638	19–3	98000	Bkgd	0
COPPER	UGL	1/7	14	8.09	3.32	3.32(c)	SB–4	1	Bkgd	1
LEAD	UGL	1/7	14	1.26	21.8	9.53	SB–4	5	Bkgd	1
MAGNESIUM	UGL	6/6	100	DLNA	30364 – 39474	37227	19–3	58000	Bkgd	0
MANGANESE	UGL	2/6	33	2.75	46.4 – 66.2	43.6	19–3	140	Bkgd	0
NICKEL	UGL	1/7	14	34.3	18.5	17.7	SB–4		NSA	NA
POTASSIUM	UGL	6/6	100	DLNA	3371 – 5562	5224	19–2	26000	Bkgd	0
SELENIUM	UGL	2/7	29	3.02 – 5	43.7 – 47	29.8	19–2	1	Bkgd	2
SILVER	UGL	1/7	14	0.25	0.32	0.207	SB–4	1	Bkgd	0
SODIUM	UGL	6/6	100	DLNA	66038 – 80713	79463	19–3	100000	Bkgd	0
VANADIUM	UGL	6/6	100	DLNA	38.2 – 133	89.5	19–3		NSA	NA
ZINC	UGL	1/7	14	21.1	33.7	20.3	SB–4	40	Bkgd	0
Explosives										
13DNB	UGL	1/9	11	0.519 – 0.611	0.707	0.415	19–3		NSA	NA
TCL Semivolatile TICs										
CAPROLACTAM	UGL	4/4	100	DLNA	8 – 60	60(c)	SB–4		NSA	NA
OCTADECANOIC ACID	UGL	1/1	100	DLNA	4	4(b)	19–2		NSA	NA
Other Inorganics										
NITRATE/NITRITE	UGL	6/7	86	5000	107 – 6700	4570	19–2	54000	Bkgd	0

(a) – Upper 95 percent confidence limit on the arithmetic mean. Calculated assuming one–half the detection level as the concentration for those samples in which a given analyte was not detected.
(b) – Since the frequency of detection for this chemical is 1/1, the concentration presented is not the 95 percent upper confidence limit, but the concentration detected in the sole sample collected.
(c) – The 95 percent upper confidence limit on the arithmetic mean exceeds the maximum detected concentration; therefore, the maximum detected value is presented (USEPA, 1989b).
– Contaminant of concern.
Bkgd – The maximum detected concentration in UMDA background groundwater (see Section 3.1).
DLNA – Detection level not available. The detection levels could not be ascertained because constituents were detected in all relevant samples.
NA – Not applicable.
NSA – No standard for comparison available.
TAL – Target analyte list.
TCL – Target compound list.
TIC – Tentatively identified compound.
UGL – ug/l
* Replaces original TABLE 3–31 in the Final Baseline RA; Dames & Moore, 1992a.

TABLE 3–32*

Occurrence and Distribution of Analytes Detected in Surface Soil (to a depth of 2 feet) at Site 19

COMPOUND	UNITS	Frequency of Detection	Percent Positive Detections	Range of Sample Detection Limits	Range of Detected Concentrations	Upper 95 Percent Confidence Limit (a)	Location of Max. Conc.	Comparison Criteria Concentration	Comparison Criteria Type	Number of Exceedances
TAL Inorganics										
ALUMINUM	UGG	12/12	100	DLNA	4390 – 26000	12641	S19A008	8604	Bkgd	3
ANTIMONY	UGG	4/12	33	7.14 – 71	31 – 3710	890	S19A010	3.8	Bkgd	4
ARSENIC	UGG	12/12	100	DLNA	1.57 – 290	70.2	S19A010	5.24	Bkgd	2
BARIUM	UGG	12/12	100	DLNA	88.6 – 29000	8100	S19A010	233	Bkgd	8
BERYLLIUM	UGG	8/12	67	1.86	0.65 – 1.26	1.01	S19B014	1.86	Bkgd	0
CADMIUM	UGG	7/12	58	0.7 – 31	2.02 – 760	183	S19A008	3.05	Bkgd	4
CALCIUM	UGG	12/12	100	DLNA	3340 – 18800	12130	S19B013	29006	Bkgd	0
CHROMIUM	UGG	11/12	92	12.7	6.86 – 43.9	22	S19A009	32.7	Bkgd	2
COBALT	UGG	8/12	67	15	6.35 – 9.62	8.29	S19B019	15	Bkgd	0
COPPER	UGG	12/12	100	DLNA	9 – 130000	31693	S19A008	58.6	Bkgd	7
IRON	UGG	12/12	100	DLNA	13800 – 26000	20768	S19A009	26233	Bkgd	0
LEAD	UGG	12/12	100	DLNA	4.26 – 4400	1225	S19A009	8.37	Bkgd	9
MAGNESIUM	UGG	12/12	100	DLNA	3170 – 6300	4830	S19A009	8585	Bkgd	0
MANGANESE	UGG	12/12	100	DLNA	316 – 747	533	S19A009	874	Bkgd	0
MERCURY	UGG	3/12	25	0.05	0.076 – 3.7	0.889	S19A010	0.056	Bkgd	3
NICKEL	UGG	11/12	92	12.6	8.72 – 43.2	23.5	S19A009	12.6	Bkgd	4
POTASSIUM	UGG	12/12	100	DLNA	1230 – 3610	2652	S19A008	2179	Bkgd	4
SILVER	UGG	7/12	58	0.025	0.046 – 3.4	1.37	S19A010	0.038	Bkgd	7
SODIUM	UGG	12/12	100	DLNA	198 – 1160	722	S19A010	978	Bkgd	3
THALLIUM	UGG	3/12	25	6.62 – 31.3	8.44 – 10.5	10.5(c)	S19B013	31.3	Bkgd	0
VANADIUM	UGG	12/12	100	DLNA	32.8 – 67.9	53	S19A009	131	Bkgd	0
ZINC	UGG	12/12	100	DLNA	35.4 – 250000	60365	S19A008	94	Bkgd	8
Explosives										
135TNB	UGG	2/12	17	0.488	0.621 – 170	39.8	S19A007		NSA	NA
246TNT	UGG	4/12	33	0.456	0.543 – 43000	10019	S19A007		NSA	NA
NITROBENZENE	UGG	1/12	8	2.41 – 240	3.23	3.23(c)	S19A010		NSA	NA
TETRYL	UGG	1/12	8	0.731 – 73	1.48	1.48(c)	S19B016		NSA	NA

TABLE 3-32* (cont'd)

Occurrence and Distribution of Analytes Detected in Surface Soil (to a depth of 2 feet) at Site 19

COMPOUND	UNITS	Frequency of Detection	Percent Positive Detections	Range of Sample Detection Limits	Range of Detected Concentrations	Upper 95 Percent Confidence Limit (a)	Location of Max. Conc.	Comparison Criteria Concentration	Comparison Criteria Type	Number of Exceedances
Other Inorganics										
NITRATE/NITRITE	UGG	4/4	100	DLNA	1.28 - 13	11.2	S19A007	9.9	Bkgd	1

(a) – Upper 95 percent confidence limit on the arithmetic mean. Calculated assuming one-half the detection level as the concentration for those samples in which a given analyte was not detected.
(b) – Since the frequency of detection for this chemical is 1/1, the concentration presented is not the 95 percent upper confidence limit, but the concentration detected in the sole sample collected.
(c) – The 95 percent upper confidence limit on the arithmetic mean exceeds the maximum detected concentration; therefore, the maximum detected value is presented (USEPA, 1989b).
– Contaminant of concern
Bkgd – The maximum detected concentration in UMDA background soils (see Section 3.1).
DLNA – Detection level not available. The detection levels could not be ascertained because constituents were detected in all relevant samples.
NA – Not applicable.
NSA – No standard for comparison available.
TAL – Target analyte list.
TCL – Target compound list.
TIC – Tentatively identified compound.
UGG – ug/g
* Replaces original TABLE 3-32 in the Final Baseline RA; Dames & Moore, 1992a.

Fourteen of the 22 TAL inorganics detected (Table 3-32*), and nitrite/nitrate, are selected as contaminants of concern, because concentrations exceeded background levels. Four explosives were detected in one or more samples and are selected as contaminants of concern.

- Surface and Subsurface Soil (to a depth of 10 feet)--During the original RI fieldwork, 44 soil samples were collected from this depth interval and analyzed for TAL metals, explosives, and nitrite/nitrate. (Weston previously collected four soil samples from this depth interval and analyzed for explosives, BNAs, and nitrite/nitrate.) During followup fieldwork, nine additional samples were collected. Eight of these were analyzed for TAL metals and explosives, while the remaining sample was analyzed for explosives only. The occurrence and distribution of analytes detected in these soil samples are presented in Table 3-33*, and the contaminant selection rationale is summarized in Table 3-3*.

  Concentrations of 16 of the 22 TAL metals detected (Table 3-33*), and nitrite/nitrate, exceeded background levels; these constituents are selected as contaminants of concern. Eight explosives were detected and are selected as contaminants of concern.

  Five TCL VOAs were detected. Acetone, toluene, and trichlorofluoromethane are common laboratory contaminants. Although they were not detected in method blanks associated with the sample set, they were detected in other laboratory blanks at comparable concentrations and were detected at low concentrations in site samples, often at or just slightly above the detection limit. Therefore, they are not selected as contaminants of concern. Trichloroethylene and tetrachloroethylene are selected as contaminants of concern.

  Two TCL semivolatile TICs were detected (Table 3-33*), but they are not selected as contaminants of concern.

TABLE 3-33*

Occurrence and Distribution of Analytes Detected in Surface and Subsurface Soil (to a depth of 10 feet) at Site 19

COMPOUND	UNITS	Frequency of Detection	Percent Positive Detections	Range of Sample Detection Limits	Range of Detected Concentrations	Upper 95 Percent Confidence Limit (a)	Location of Max. Conc.	Comparison Criteria Concentration	Comparison Criteria Type	Number of Exceedances
TAL Inorganics										
ALUMINUM	UGG	52/52	100	DLNA	4390 – 26000	7983	S19A008	8604	Bkgd	6
ANTIMONY	UGG	4/52	8	3.8 – 71	31 – 3710	197	S19A010	3.8	Bkgd	4
ARSENIC	UGG	52/52	100	DLNA	1.57 – 290	18.7	S19A010	5.24	Bkgd	8
BARIUM	UGG	52/52	100	DLNA	88.6 – 29000	1926	S19A010	233	Bkgd	8
BERYLLIUM	UGG	8/52	15	1.86	0.65 – 1.26	0.946	S19B014	1.86	Bkgd	0
CADMIUM	UGG	7/52	13	0.7 – 31	2.02 – 760	41.5	S19A008	3.05	Bkgd	4
CALCIUM	UGG	52/52	100	DLNA	3340 – 39000	18775	S19A005	29006	Bkgd	3
CHROMIUM	UGG	12/52	23	12.7	6.86 – 43.9	10.5	S19A009	32.7	Bkgd	2
COBALT	UGG	8/52	15	15	6.35 – 9.62	7.67	S19B019	15	Bkgd	0
COPPER	UGG	12/52	23	58.6	9 – 130000	7003	S19A008	58.6	Bkgd	7
IRON	UGG	52/52	100	DLNA	13800 – 26000	18267	S19A009	26233	Bkgd	0
LEAD	UGG	52/52	100	DLNA	3.02 – 4400	282	S19A009	8.37	Bkgd	14
MAGNESIUM	UGG	52/52	100	DLNA	3170 – 10000	6674	S19A006	8585	Bkgd	2
MANGANESE	UGG	52/52	100	DLNA	316 – 792	521	S19A001	874	Bkgd	0
MERCURY	UGG	3/52	6	0.05	0.076 – 3.7	0.214	S19A010	0.056	Bkgd	3
NICKEL	UGG	13/52	25	12.6	8.72 – 43.2	11.5	S19A009	12.6	Bkgd	6
POTASSIUM	UGG	52/52	100	DLNA	956 – 5220	2394	S19A009	2179	Bkgd	14
SILVER	UGG	14/52	27	0.025	0.03 – 3.4	0.331	S19A010	0.038	Bkgd	9
SODIUM	UGG	52/52	100	DLNA	198 – 1160	557	S19A010	978	Bkgd	3
THALLIUM	UGG	3/52	6	6.62 – 31.3	8.44 – 10.5	10.5(c)	S19B013	31.3	Bkgd	0
VANADIUM	UGG	52/52	100	DLNA	32.8 – 99.5	68.4	S19A004	131	Bkgd	0
ZINC	UGG	48/52	92	30.2	35.4 – 250000	13323	S19A008	94	Bkgd	9
Explosives										
135TNB	UGG	6/57	11	0.488 – 2.09	0.621 – 170	10.2	S19A007		NSA	NA
246TNT	UGG	9/57	16	0.456 – 1.92	0.543 – 43000	2001	S19A007		NSA	NA
24DNT	UGG	1/57	2	0.42 – 42	1.54	1.2	S19A008		NSA	NA
26DNT	UGG	1/57	2	0.4 – 52	0.87	0.87(c)	S19A007		NSA	NA
HMX	UGG	4/57	7	0.666 – 67	0.97 – 30	3.21	S19A007		NSA	NA
NITROBENZENE	UGG	2/57	4	0.42 – 240	3.23 – 7.67	6.8	S19A008		NSA	NA
RDX	UGG	6/57	11	0.587 – 59	1.48 – 26	3.08	S19A007		NSA	NA
TETRYL	UGG	1/57	2	0.25 – 73	1.48	1.48(c)	S19B016		NSA	NA

TABLE 3–33* (cont'd)
Occurrence and Distribution of Analytes Detected in Surface and Subsurface Soil (to a depth of 10 feet) at Site 19

COMPOUND	UNITS	Frequency of Detection	Percent Positive Detections	Range of Sample Detection Limits	Range of Detected Concentrations	Upper 95 Percent Confidence Limit (a)	Location of Max. Conc.	Comparison Criteria Concentration	Comparison Criteria Type	Number of Exceedances
TCL Volatiles										
ACETONE	UGG	1/10	10	0.017	0.021	0.012	S19A005		NSA	NA
TETRACHLOROETHYLENE	UGG	2/10	20	0.001	0.003	0.002	S19A006		NSA	NA
TOLUENE	UGG	1/10	10	0.001	0.001	0.001(c)	S19A006		NSA	NA
TRICHLOROETHYLENE	UGG	1/10	10	0.003	0.004	0.002	S19A002		NSA	NA
TRICHLOROFLUOROMETHANE	UGG	2/10	20	0.006	0.017 – 0.018	0.009	S19A007		NSA	NA
TCL Semivolatile TICs										
2–CYCLOHEXEN–ONE	UGG	5/5	100	DLNA	0.104 – 0.212	0.212(c)	S19A007		NSA	NA
CYCLOHEXENE OXIDE	UGG	5/5	100	DLNA	0.742 – 0.848	0.848(c)	S19A007		NSA	NA
Other Inorganics										
NITRATE/NITRITE	UGG	18/48	38	0.6 – 500	0.599 – 13	13(c)	S19A007	9.9	Bkgd	1

(a) – Upper 95 percent confidence limit on the arithmetic mean. Calculated assuming one–half the detection level as the concentration for those samples in which a given analyte was not detected.
(b) – Since the frequency of detection for this chemical is 1/1, the concentration presented is not the 95 percent upper confidence limit, but the concentration detected in the sole sample collected.
(c) – The 95 percent upper confidence limit on the arithmetic mean exceeds the maximum detected concentration; therefore, the maximum detected value is presented (USEPA, 1989b).
(shaded) – Contaminant of concern
Bkgd – The maximum detected concentration in UMDA background soils (see Section 3.1).
DLNA – Detection level not available. The detection levels could not be ascertained because constituents were detected in all relevant samples.
NA – Not applicable.
NSA – No standard for comparison available.
TAL – Target analyte list.
TCL – Target compound list.
TIC – Tentatively identified compound.
UGG – ug/g
* Replaces original TABLE 3–33 in the Final Baseline RA; Dames & Moore, 1992a.

3.4* OPERABLE UNIT C: INACTIVE LANDFILLS

3.4.1* Site 12: Inactive Landfill

3.4.1.1* Groundwater. No additional groundwater sampling was planned at Site 12 during the followup fieldwork; therefore, groundwater data for this site are not included in the addendum.

3.4.1.2* Soil

- Surface Soil (to a depth of 2 feet)--Surface soil samples were not collected from Site 12 during the original RI fieldwork, because contamination was expected to be primarily in the subsurface soil. However, because the western inactive disposal site had some exposed drums, five surface soil samples were collected during the followup fieldwork and analyzed for TAL inorganics, TCL VOAs, TCL BNAs, TCL pesticides/PCBs, and explosives. The occurrence and distribution of analytes detected in these samples are presented in Table 3-62A, and the contaminant selection rationale is summarized in Table 3-3*.

  Three of the 19 metals detected (Table 3-62A) are selected as contaminants of concern, because detected concentrations exceeded background levels in at least one sample.

  One TCL VOA--trichlorofluoromethane, a common laboratory contaminant--was detected in two surface soil samples. Although it was not detected in method blanks associated with the sample set, it does not appear to be a site-related chemical based on site history information, it was detected in other laboratory blanks at similar concentrations, and the levels detected were low. Therefore, trichlorofluoromethane is not selected as a contaminant of concern for this site.

  Five TCL BNAs and two TCL pesticides (Table 3-62A) were detected and are selected as contaminants of concern.

TABLE 3-62A
Occurrence and Distribution of Analytes Detected in Surface Soil (to a depth of 2 feet) at Site 12

COMPOUND	UNITS	Frequency of Detection	Percent Positive Detections	Range of Sample Detection Limits	Range of Detected Concentrations	Upper 95 Percent Confidence Limit (a)	Location of Max. Conc.	Comparison Criteria Concentration	Comparison Criteria Type	Number of Exceedances
TAL Inorganics										
ALUMINUM	UGG	5 / 5	100	DLNA	4630 – 7610	6895	S12B009	8604	Bkgd	0
ARSENIC	UGG	5 / 5	100	DLNA	1.2 – 2.02	1.96	S12B011	5.24	Bkgd	0
BARIUM	UGG	5 / 5	100	DLNA	79 – 136	123	S12B011	233	Bkgd	0
BERYLLIUM	UGG	5 / 5	100	DLNA	1.26 – 1.66	1.57	S12B012	1.86	Bkgd	0
CALCIUM	UGG	5 / 5	100	DLNA	4000 – 5670	5472	S12B011	29006	Bkgd	0
CHROMIUM	UGG	5 / 5	100	DLNA	6.41 – 12.3	10.6	S12B010	32.7	Bkgd	0
COBALT	UGG	5 / 5	100	DLNA	6.46 – 9.73	9.46	S12B009	15	Bkgd	0
COPPER	UGG	5 / 5	100	DLNA	10.4 – 19.2	18.8	S12B009	58.6	Bkgd	0
IRON	UGG	5 / 5	100	DLNA	14000 – 24400	23896	S12B009	26233	Bkgd	0
LEAD	UGG	5 / 5	100	DLNA	8.8 – 29	26.1	S12B012	8.37	Bkgd	5
MAGNESIUM	UGG	5 / 5	100	DLNA	3110 – 4060	4060(c)	S12B009	8585	Bkgd	0
MANGANESE	UGG	5 / 5	100	DLNA	268 – 409	403	S12B009	874	Bkgd	0
NICKEL	UGG	5 / 5	100	DLNA	7.31 – 9.64	9.64(c)	S12B009	12.6	Bkgd	0
POTASSIUM	UGG	5 / 5	100	DLNA	818 – 1770	1697	S12B009	2179	Bkgd	0
SILVER	UGG	4 / 5	80	0.025	0.047 – 0.064	0.064(c)	S12B012	0.038	Bkgd	4
SODIUM	UGG	5 / 5	100	DLNA	251 – 367	343	S12B009	978	Bkgd	0
THALLIUM	UGG	5 / 5	100	DLNA	14.4 – 27	23.3	S12B012	31.3	Bkgd	0
VANADIUM	UGG	5 / 5	100	DLNA	39.5 – 72	68.2	S12B009	131	Bkgd	0
ZINC	UGG	5 / 5	100	DLNA	59.7 – 177	136	S12B012	94	Bkgd	1
TCL Volatiles										
TRICHLOROFLUOROMETHANE	UGG	2 / 5	40	0.006	0.007	0.007(c)	S12B013		NSA	NA
TCL Semivolatiles										
BENZO [K] FLUORANTHENE	UGG	1 / 5	20	0.066	0.11	0.081	S12B012		NSA	NA
CHRYSENE	UGG	1 / 5	20	0.12	0.26	0.185	S12B012		NSA	NA
FLUORANTHENE	UGG	1 / 5	20	0.068	0.18	0.125	S12B012		NSA	NA
PHENANTHRENE	UGG	2 / 5	40	0.033	0.039 – 0.14	0.097	S12B012		NSA	NA
PYRENE	UGG	2 / 5	40	0.033	0.1 – 0.38	0.256	S12B012		NSA	NA

TABLE 3-62A (cont'd)

Occurrence and Distribution of Analytes Detected in Surface Soil (to a depth of 2 feet) at Site 12

COMPOUND	UNITS	Frequency of Detection	Percent Positive Detections	Range of Sample Detection Limits	Range of Detected Concentrations	Upper 95 Percent Confidence Limit (a)	Location of Max. Conc.	Comparison Criteria Concentration	Comparison Criteria Type	Number of Exceedances
TCL Pesticides/PCBs										
DDE	UGG	2/5	40	0.008	0.019 – 0.22	0.141	S12B013		NSA	NA
DDT	UGG	1/5	20	0.007	0.095	0.061	S12B013		NSA	NA

(a) – Upper 95 percent confidence limit on the arithmetic mean. Calculated assuming one-half the detection level as the concentration for those samples in which a given analyte was not detected.
(b) – Since the frequency of detection for this chemical is 1/1, the concentration presented is not the 95 percent upper confidence limit, but the concentration detected in the sole sample collected.
(c) – The 95 percent upper confidence limit on the arithmetic mean exceeds the maximum detected concentration; therefore, the maximum detected value is presented (USEPA, 1989b).
– Contaminant of concern.
Bkgd – The maximum detected concentration in UMDA background soils (see Section 3.1).
DLNA – Detection level not available. The detection levels could not be ascertained because constituents were detected in all relevant samples.
NA – Not applicable.
NSA – No standard for comparison available.
TAL – Target analyte list.
TCL – Target compound list.
TIC – Tentatively identified compound.
UGG – ug/g

- Surface and Subsurface Soil (to a depth of 10 feet)--During the original RI fieldwork, 24 soil samples were collected from a depth of 2.5 to 10 feet and analyzed for TAL inorganics, TCL VOAs, TCL BNAs, TCL pesticides/PCBs, explosives, and nitrite/nitrate. (Weston had previously collected eight subsurface soil samples from the western portion of the landfill and analyzed for explosives, nitrite/nitrate, VOAs, BNAs, metals, and cyanide.) During the followup fieldwork, 17 additional subsurface soil samples were collected at this site and analyzed for TAL metals, TCL VOAs, TCL BNAs, TCL pesticides/PCBs, and explosives. The occurrence and distribution of analytes detected in Site 12 soil samples are presented in Table 3-63*, and the contaminant selection rationale is summarized in Table 3-3*.

  Fifteen of the 22 TAL metals (Table 3-63*), and nitrite/nitrate, are selected as contaminants of concern, because detected concentrations exceeded background levels. Twelve TCL BNAs and six pesticides/ PCBs (Table 3-63*) were detected and are selected as contaminants of concern. Three TCL VOAs (Table 3-63*) and one additional TCL BNA (bis(2-ethylhexyl) phthalate) were also detected. Although they were not detected in method blanks associated with the sample set, they are common laboratory contaminants, they were detected in other blanks, and the concentrations detected in site samples were low. Therefore, they are not included as contaminants of concern for Site 12. One TCL VOA TIC and 10 semivolatile TICs were detected in site soil samples (Table 3-63*), but they are not selected as contaminants of concern.

3.4.2* Site 50: Railroad Landfill Areas

3.4.2.1* Groundwater. One flood gravel well (50-1) was installed downgradient of Site 50. In addition, existing well 10 may also be downgradient of Site 50. Therefore, the results from both wells are assessed in selecting groundwater contaminants of concern. During the original RI fieldwork, groundwater samples were analyzed for

TABLE 3–63*

Occurrence and Distribution of Analytes Detected in Surface and Subsurface Soil (to a depth of 10 feet) at Site 12

COMPOUND	UNITS	Frequency of Detection	Percent Positive Detections	Range of Sample Detection Limits	Range of Detected Concentrations	Upper 95 Percent Confidence Limit (a)	Location of Max. Conc.	Comparison Criteria Concentration	Comparison Criteria Type	Number of Exceedances
TAL Inorganics										
ALUMINUM	UGG	41/41	100	DLNA	195 – 16200	6107	S12B010	8604	Bkgd	3
ANTIMONY	UGG	3/49	6	3.8 – 25.3	11.1 – 20.4	6.16	S12B010	3.8	Bkgd	3
ARSENIC	UGG	41/49	84	5.7	1.2 – 360	29.5	S12B010	5.24	Bkgd	5
BARIUM	UGG	41/41	100	DLNA	68 – 559	173	S12B010	233	Bkgd	4
BERYLLIUM	UGG	19/49	39	0.33 – 1.86	1.26 – 3.92	1.35	S12A004	1.86	Bkgd	6
CADMIUM	UGG	8/49	16	0.7 – 3.05	1.3 – 33.9	4.13	S12B010	3.05	Bkgd	7
CALCIUM	UGG	41/41	100	DLNA	4000 – 25100	10959	S12B010	29006	Bkgd	0
CHROMIUM	UGG	19/49	39	2.5 – 12.7	5.04 – 52.1	12.9	S12B010	32.7	Bkgd	4
COBALT	UGG	17/41	41	15	6.46 – 19.3	9.36	S12B010	15	Bkgd	1
COPPER	UGG	29/49	59	58.6	10.4 – 1470	157	S12B010	58.6	Bkgd	10
IRON	UGG	41/41	100	DLNA	14000 – 95000	28998	S12A004	26233	Bkgd	11
LEAD	UGG	42/49	86	4.78	2.67 – 1300	187	S12B009	8.37	Bkgd	25
MAGNESIUM	UGG	41/41	100	DLNA	3110 – 7060	5179	S12A002	8585	Bkgd	0
MANGANESE	UGG	41/41	100	DLNA	268 – 701	486	S12B010	874	Bkgd	0
MERCURY	UGG	4/49	8	0.05 – 0.1	0.051 – 0.346	0.05	S12A003	0.056	Bkgd	3
NICKEL	UGG	27/49	55	12.6	5.3 – 90.5	16	S12B010	12.6	Bkgd	9
POTASSIUM	UGG	41/41	100	DLNA	600 – 2080	1259	S12B010	2179	Bkgd	0
SILVER	UGG	34/49	69	0.025 – 0.648	0.031 – 63	6.66	S12B010	0.038	Bkgd	26
SODIUM	UGG	41/41	100	DLNA	251 – 1270	620	S12B009	978	Bkgd	2
THALLIUM	UGG	17/49	35	7.93 – 310	14.4 – 36.1	24.3	S12B009	31.3	Bkgd	2
VANADIUM	UGG	41/41	100	DLNA	39.5 – 137	81.9	S12A003	131	Bkgd	2
ZINC	UGG	40/49	82	30.2 – 52	39.9 – 5370	600	S12B010	94	Bkgd	16
TCL Volatiles										
CHLOROFORM	UGG	9/49	18	0.001 – 5	0.002 – 0.005	0.005(c)	S12A004		NSA	NA
TOLUENE	UGG	2/49	4	0.001 – 5	0.001	0.001(c)	S12B010		NSA	NA
TRICHLOROFLUOROMETHANE	UGG	11/41	27	0.006	0.005 – 0.009	0.005	S12A004		NSA	NA

TABLE 3-63* (cont'd)

Occurrence and Distribution of Analytes Detected in Surface and Subsurface Soil (to a depth of 10 feet) at Site 12

COMPOUND	UNITS	Frequency of Detection	Percent Positive Detections	Range of Sample Detection Limits	Range of Detected Concentrations	Upper 95 Percent Confidence Limit (a)	Location of Max. Conc.	Comparison Criteria Concentration	Comparison Criteria Type	Number of Exceedances
TCL Volatile TICs										
TRICHLOROTRIFLUOROETHANE	UGG	2/2	100	DLNA	0.006 – 0.008	0.008(c)	S12B011		NSA	NA
TCL Semivolatiles										
ANTHRACENE	UGG	4/49	8	0.033 – 0.3	0.083 – 0.27	0.065	S12B009		NSA	NA
BENZO [A] ANTHRACENE	UGG	4/49	8	0.17 – 0.3	0.36 – 0.99	0.187	S12B009		NSA	NA
BENZO [A] PYRENE	UGG	4/49	8	0.25 – 0.3	0.47 – 1.2	0.243	S12B009		NSA	NA
BENZO [B] FLUORANTHENE	UGG	4/49	8	0.21 – 0.3	0.33 – 0.88	0.185	S12B009		NSA	NA
BENZO [G,H,I] PERYLENE	UGG	4/49	8	0.25 – 0.3	0.3 – 0.59	0.182	S12B009		NSA	NA
BENZO [K] FLUORANTHENE	UGG	5/49	10	0.066 – 0.3	0.11 – 0.66	0.125	S12B009		NSA	NA
BIS(2-ETHYLHEXYL) PHTHALATE	UGG	2/49	4	0.3 – 0.62	1.37 – 1.9	0.404	S12B009		NSA	NA
CHRYSENE	UGG	5/49	10	0.12 – 0.3	0.26 – 1.6	0.235	S12B009		NSA	NA
FLUORANTHENE	UGG	5/49	10	0.068 – 0.3	0.18 – 1.8	0.208	S12B009		NSA	NA
INDENO [1,2,3-C,D] PYRENE	UGG	3/49	6	0.29 – 0.3	0.34 – 0.47	0.179	S12B009		NSA	NA
NAPHTHALENE	UGG	1/49	2	0.037 – 0.3	0.052	0.052(c)	S12B010		NSA	NA
PHENANTHRENE	UGG	6/49	12	0.033 – 0.3	0.039 – 1.4	0.167	S12B009		NSA	NA
PYRENE	UGG	6/49	12	0.033 – 0.3	0.1 – 3.9	0.366	S12B009		NSA	NA
TCL Semivolatile TICs										
2,6,10,14-TETRAMETHYLPENTADECANE	UGG	1/1	100	DLNA	0.204	0.204(b)	S12A004		NSA	NA
2-CYCLOHEXEN-1-OL	UGG	6/6	100	DLNA	0.103 – 0.309	0.287	S12A006		NSA	NA
2-CYCLOHEXEN-ONE	UGG	3/3	100	DLNA	0.205 – 0.206	0.206(c)	S12A006		NSA	NA
9H-CARBAZOLE	UGG	1/1	100	DLNA	0.095	0.095(b)	S12B009		NSA	NA
BENZO [C] PHENANTHRENE	UGG	1/1	100	DLNA	0.32	0.32(b)	S12B009		NSA	NA
BENZO[E]PYRINE	UGG	3/3	100	DLNA	0.42 – 0.64	0.64(c)	S12B009		NSA	NA
CYCLOHEXENE OXIDE	UGG	4/4	100	DLNA	0.215 – 1.03	1.03(c)	S12A006		NSA	NA
HEXADECANOIC ACID	UGG	1/1	100	DLNA	0.215	0.215(b)	S12A002		NSA	NA
TETRACOSANE	UGG	1/1	100	DLNA	0.32	0.32(b)	S12B009		NSA	NA
TOLUENE	UGG	2/2	100	DLNA	1.05	1.05(c)	S12A005		NSA	NA

TABLE 3-63* (cont'd)
Occurrence and Distribution of Analytes Detected in Surface and Subsurface Soil (to a depth of 10 feet) at Site 12

COMPOUND	UNITS	Frequency of Detection	Percent Positive Detections	Range of Sample Detection Limits	Range of Detected Concentrations	Upper 95 Percent Confidence Limit (a)	Location of Max. Conc.	Comparison Criteria Concentration	Comparison Criteria Type	Number of Exceedances
TCL Pesticides/PCBs										
DDD	UGG	1/41	2	0.008	0.057	0.007	S12A003		NSA	NA
DDE	UGG	5/41	12	0.008 – 0.076	0.014 – 0.22	0.022	S12B013		NSA	NA
DDT	UGG	7/41	17	0.007 – 0.071	0.009 – 0.19	0.022	S12B010		NSA	NA
DIELDRIN	UGG	2/41	5	0.006	0.009	0.004	S12B009		NSA	NA
ENDRIN	UGG	1/41	2	0.007	0.01	0.004	S12B009		NSA	NA
PCB-1260	UGG	2/41	5	0.08	0.174 – 0.194	0.055	S12B009		NSA	NA
Other Inorganics										
NITRATE/NITRITE	UGG	15/32	47	0.6 – 500	0.653 – 20	20(c)	S12A001	9.9	Bkgd	3

(a) – Upper 95 percent confidence limit on the arithmetic mean. Calculated assuming one-half the detection level as the concentration for those samples in which a given analyte was not detected.
(b) – Since the frequency of detection for this chemical is 1/1, the concentration presented is not the 95 percent upper confidence limit, but the concentration detected in the sole sample collected.
(c) – The 95 percent upper confidence limit on the arithmetic mean exceeds the maximum detected concentration; therefore, the maximum detected value is presented (USEPA, 1989b).
– Contaminant of concern
Bkgd – The maximum detected concentration in UMDA background soils (see Section 3.1).
DLNA – Detection level not available. The detection levels could not be ascertained because constituents were detected in all relevant samples.
NA – Not applicable.
NSA – No standard for comparison available.
TAL – Target analyte list.
TCL – Target compound list.
TIC – Tentatively identified compound.
UGG – ug/g
* Replaces original TABLE 3-63 in the Final Baseline RA; Dames & Moore, 1992a.

TAL inorganics, TCL VOAs, TCL BNAs, TCL pesticides/PCBs, explosives, and nitrite/nitrate. During followup fieldwork, groundwater samples from wells 10 and 50-1 were analyzed only for explosives to confirm low-level detections noted during the RI. The occurrence and distribution of analytes detected in these two wells are presented in Table 3-64*, and the contaminant selection rationale is summarized in Table 3-2*.

Six of the 12 TAL inorganics (see Table 3-64*) are selected as contaminants of concern, because detected concentrations exceeded background levels or background levels were not available. The one explosive detected is selected as a contaminant of concern. Two semivolatile TICs were also detected, but neither is selected as a contaminant of concern. No TCL pesticides/PCBs were detected.

3.4.2.2* Soil. No additional soil sampling was planned at Site 50 during the followup fieldwork; therefore, soil data for this site are not included in the addendum.

3.6 OPERABLE UNIT E: DEACTIVATION FURNACE AND SOUTHWESTERN WAREHOUSE AREA

3.6.4* Site 26: Metal Ingot Stockpiles

3.6.4.1* Groundwater. Contamination at Site 26--if any--is expected to be restricted to surface and near-surface soil. No groundwater sampling was planned at Site 26 for the RI, or the followup fieldwork.

3.6.4.2* Soil. During the original RI fieldwork, six surface soil samples were collected near the stockpiles and analyzed for aluminum, lead, and zinc. Three additional samples were collected during the followup fieldwork and analyzed for TAL metals. The occurrence and distribution of analytes detected in these samples are presented in Table 3-71*, and the contaminant selection rationale is summarized in Table 3-3*. Detected concentrations of three of the 18 metals exceeded background levels; these three metals are selected as contaminants of concern. Nickel is not selected as a contaminant of concern, because the maximum detected level (13.4 micrograms per

TABLE 3–64*

Occurrence and Distribution of Analytes Detected in Groundwater at Site 50

COMPOUND	UNITS	Frequency of Detection	Percent Positive Detections	Range of Sample Detection Limits	Range of Detected Concentrations	Upper 95 Percent Confidence Limit (a)	Location of Max. Conc.	Comparison Criteria Concentration	Comparison Criteria Type	Number of Exceedances
TAL Inorganics										
ARSENIC	UGL	4/5	80	5	4.37 – 5.86	5.51	010	1	Bkgd	4
BARIUM	UGL	4/4	100	DLNA	33.4 – 44.8	44.6	50–1	59	Bkgd	0
CALCIUM	UGL	4/4	100	DLNA	57000 – 62000	62000(c)	50–1	98000	Bkgd	0
COPPER	UGL	2/5	40	8.09	6.65 – 8.54	7.42	010	1	Bkgd	2
CYANIDE	UGL	1/5	20	2.5	18.5	12.1	010		NSA	NA
LEAD	UGL	1/5	20	1.26	4.65	3.15	010	5	Bkgd	0
MAGNESIUM	UGL	4/4	100	DLNA	17200 – 18826	18717	010	58000	Bkgd	0
NICKEL	UGL	2/5	40	34.3	43.6 – 67	53.8	010		NSA	NA
POTASSIUM	UGL	4/4	100	DLNA	4930 – 5630	5630(c)	50–1	26000	Bkgd	0
SODIUM	UGL	4/4	100	DLNA	25100 – 31656	31656(c)	010	100000	Bkgd	0
VANADIUM	UGL	4/4	100	DLNA	26.7 – 30.9	30.9(c)	50–1		NSA	NA
ZINC	UGL	2/5	40	21.1	112 – 810	523	010	40	Bkgd	2
Explosives										
RDX	UGL	1/7	14	0.63 – 2.11	3.48	1.94	50–1		NSA	NA
TCL Semivolatile TICs										
CAPROLACTAM	UGL	1/1	100	DLNA	10	10(b)	010		NSA	NA
DI–N–BUTYL PHTHALATE	UGL	1/1	100	DLNA	39.8	39.8(b)	010		NSA	NA
Other Inorganics										
NITRATE/NITRITE	UGL	5/5	100	DLNA	9000 – 10000	9881	010	54000	Bkgd	0

(a) – Upper 95 percent confidence limit on the arithmetic mean. Calculated assuming one–half the detection level as the concentration for those samples in which a given analyte was not detected.
(b) – Since the frequency of detection for this chemical is 1/1, the concentration presented is not the 95 percent upper confidence limit, but the concentration detected in the sole sample collected.
(c) – The 95 percent upper confidence limit on the arithmetic mean exceeds the maximum detected concentration; therefore, the maximum detected value is presented (USEPA, 1989b).
– Contaminant of concern
Bkgd – The maximum deteceted concentration in UMDA background groundwater (see Section 3.1).
DLNA – Detection level not available. The detection levels could not be ascertained because constituents were detected in all relevant samples.
NA – Not applicable.
NSA – No standard for comparison available.
TAL – Target analyte list.
TCL – Target compound list.
TIC – Tenatively identified compound.
UGL – ug/l
* Replaces original TABLE 3–64 in the Final Baseline RA; Dames & Moore, 1992a.

TABLE 3–71*

Occurrence and Distribution of Analytes Detected in Surface Soil (to a depth of 2 feet) at Site 26

COMPOUND	UNITS	Frequency of Detection	Percent Positive Detections	Range of Sample Detection Limits	Range of Detected Concentrations	Upper 95 Percent Confidence Limit (a)	Location of Max. Conc.	Comparison Criteria Concentration	Comparison Criteria Type	Number of Exceedances
TAL Inorganics										
ALUMINUM	UGG	9/9	100	DLNA	4760 – 6600	6350	S26A001	8604	Bkgd	0
ARSENIC	UGG	3/3	100	DLNA	2.18 – 2.3	2.3(c)	S26B008	5.24	Bkgd	0
BARIUM	UGG	3/3	100	DLNA	82 – 91	91(c)	S26B009	233	Bkgd	0
BERYLLIUM	UGG	3/3	100	DLNA	0.755 – 0.833	0.833(c)	S26B008	1.86	Bkgd	0
CALCIUM	UGG	3/3	100	DLNA	5120 – 6140	6140(c)	S26B007	29006	Bkgd	0
CHROMIUM	UGG	3/3	100	DLNA	6.99 – 7.4	7.4(c)	S26B007	32.7	Bkgd	0
COBALT	UGG	3/3	100	DLNA	8.13 – 9.93	9.93(c)	S26B009	15	Bkgd	0
COPPER	UGG	3/3	100	DLNA	12.8 – 14.7	14.7(c)	S26B008	58.6	Bkgd	0
IRON	UGG	3/3	100	DLNA	20100 – 25100	25100(c)	S26B009	26233	Bkgd	0
LEAD	UGG	9/9	100	DLNA	11.5 – 1200	469	S26A005	8.37	Bkgd	9
MAGNESIUM	UGG	3/3	100	DLNA	3700 – 4180	4180(c)	S26B009	8585	Bkgd	0
MANGANESE	UGG	3/3	100	DLNA	307 – 374	374(c)	S26B009	874	Bkgd	0
NICKEL	UGG	3/3	100	DLNA	7.93 – 13.4	13.4(c)	S26B009	12.6	Bkgd	1
POTASSIUM	UGG	3/3	100	DLNA	840 – 1080	1080(c)	S26B009	2179	Bkgd	0
SILVER	UGG	3/3	100	DLNA	0.757 – 0.874	0.874(c)	S26B009	0.038	Bkgd	3
SODIUM	UGG	3/3	100	DLNA	322 – 372	372(c)	S26B008	978	Bkgd	0
VANADIUM	UGG	3/3	100	DLNA	61.8 – 77	77(c)	S26B009	131	Bkgd	0
ZINC	UGG	9/9	100	DLNA	60.5 – 330	188	S26A003	94	Bkgd	4

(a) – Upper 95 percent confidence limit on the arithmetic mean. Calculated assuming one–half the detection level as the concentration for those samples in which a given analyte was not detected.
(b) – Since the frequency of detection for this chemical is 1/1, the concentration presented is not the 95 percent upper confidence limit, but the concentration detected in the sole sample collected.
(c) – The 95 percent upper confidence limit on the arithmetic mean exceeds the maximum detected concentration; therefore, the maximum detected value is presented (USEPA, 1989b).
– Contaminant of concern
Bkgd – The maximum detected concentration in UMDA background soils (see Section 3.1).
DLNA – Detection level not available. The detection levels could not be ascertained because constituents were detected in all relevant samples.
NA – Not applicable.
NSA – No standard for comparison available.
TAL – Target analyte list.
TCL – Target compound list.
TIC – Tentatively identified compound.
UGG – ug/g
* Replaces original TABLE 3–71 in the Final Baseline RA; Dames & Moore, 1992a.

liter ($\mu g/L$) only slightly exceeded the background level (12.6 $\mu g/L$); this exceedance is not considered to be significant.

3.7 OPERABLE UNIT F: SEWAGE TREATMENT PLANT AND VICINITY

3.7.2* Site 30: Stormwater Discharge Area

3.7.2.1* Groundwater. Groundwater contamination is not considered to be likely at this site. No groundwater sampling was planned at Site 30 for the RI or the followup fieldwork.

3.7.2.2* Soil

- Surface Soil (to a depth of 2 feet)--During the original RI fieldwork, two surface soil samples were collected at Site 30 discharge locations and analyzed for TAL inorganics, TCL VOAs, TCL BNAs, pesticides/PCBs, explosives, and nitrite/nitrate. During followup fieldwork, three additional surface soil samples were collected--one of which is part of the Site 48 soil investigation, but may be impacted by activities at Site 30. These three samples were analyzed for TAL metals, TCL BNAs, and TCL pesticides. The occurrence and distribution of analytes detected in these samples are presented in Table 3-81*, and the contaminant selection rationale is summarized in Table 3-3*.

  Three of the 19 TAL inorganics detected (Table 3-81*) are selected as contaminants of concern, because concentrations exceeded background levels. Three TCL pesticides were detected at Site 30 and are selected as contaminants of concern. No TCL VOAs, TCL BNAs, or explosives were detected. Two TCL semivolatile TICs and two TCL pesticide TICs were detected in Site 30 soil samples, but they are not selected as contaminants of concern.

- Surface and Subsurface Soil (to a depth of 10 feet)--During the original RI fieldwork, two soil samples were collected from this depth interval and analyzed for TAL inorganics, TCL VOAs, TCL BNAs, pesticides/

TABLE 3–81*

Occurrence and Distribution of Analytes Detected in Surface Soil (to a depth of 2 feet) at Site 30

COMPOUND	UNITS	Frequency of Detection	Percent Positive Detections	Range of Sample Detection Limits	Range of Detected Concentrations	Upper 95 Percent Confidence Limit (a)	Location of Max. Conc.	Comparison Criteria Concentration	Comparison Criteria Type	Number of Exceedances
TAL Inorganics										
ALUMINUM	UGG	5/5	100	DLNA	4510 – 6300	5987	S30A002	8604	Bkgd	0
ARSENIC	UGG	5/5	100	DLNA	1.22 – 2.76	2.67	S30B003	5.24	Bkgd	0
BARIUM	UGG	5/5	100	DLNA	91.7 – 127	123	S30A001	233	Bkgd	0
BERYLLIUM	UGG	2/5	40	0.5 – 1.86	0.763 – 0.892	0.892(c)	S30B003	1.86	Bkgd	0
CADMIUM	UGG	2/5	40	0.7 – 3.05	1.16 – 3.41	2.66	S30B003	3.05	Bkgd	1
CALCIUM	UGG	5/5	100	DLNA	4720 – 7580	7261	S30A001	29006	Bkgd	0
CHROMIUM	UGG	3/5	60	12.7	7.59 – 20.9	17.2	S30B003	32.7	Bkgd	0
COBALT	UGG	3/5	60	15	8.76 – 8.85	8.85(c)	S30B004	15	Bkgd	0
COPPER	UGG	3/5	60	58.6	13.3 – 45.4	39.4	S30B003	58.6	Bkgd	0
IRON	UGG	5/5	100	DLNA	21700 – 26000	25247	S30A001	26233	Bkgd	0
LEAD	UGG	5/5	100	DLNA	55 – 190	190(c)	S30B003	8.37	Bkgd	5
MAGNESIUM	UGG	5/5	100	DLNA	3530 – 6090	5491	S30A002	8585	Bkgd	0
MANGANESE	UGG	5/5	100	DLNA	334 – 526	467	S30A002	874	Bkgd	0
NICKEL	UGG	3/5	60	12.6	8.63 – 12.3	11.2	S30B004	12.6	Bkgd	0
POTASSIUM	UGG	5/5	100	DLNA	836 – 1640	1462	S30A002	2179	Bkgd	0
SILVER	UGG	5/5	100	DLNA	0.117 – 0.767	0.699	S30B004	0.038	Bkgd	5
SODIUM	UGG	5/5	100	DLNA	319 – 756	673	S30A001	978	Bkgd	0
VANADIUM	UGG	5/5	100	DLNA	57.7 – 131	124	S30A001	131	Bkgd	0
ZINC	UGG	5/5	100	DLNA	81.7 – 339	319	S30A002	94	Bkgd	4
TCL Semivolatile TICs										
2,6–DIMETHYLUNDECANE	UGG	1/1	100	DLNA	11.2	11.2(b)	S30A001		NSA	NA
DIMETHYLNAPHTHALENES	UGG	1/1	100	DLNA	4.48	4.48(b)	S30A001		NSA	NA
TCL Pesticides/PCBs										
DDD	UGG	4/5	80	0.008	0.025 – 0.246	0.201	S30A001		NSA	NA
DDE	UGG	5/5	100	DLNA	0.01 – 0.054	0.042	S48B005		NSA	NA
DDT	UGG	4/5	80	0.007	0.023 – 0.58	0.485	S30B004		NSA	NA

TABLE 3-81* (cont'd)
Occurrence and Distribution of Analytes Detected in Surface Soil (to a depth of 2 feet) at Site 30

COMPOUND	UNITS	Frequency of Detection	Percent Positive Detections	Range of Sample Detection Limits	Range of Detected Concentrations	Upper 95 Percent Confidence Limit (a)	Location of Max. Conc.	Comparison Criteria Concentration	Comparison Criteria Type	Number of Exceedances
TCL Pesticides/PCB TICs										
alpha-CHLORDANE	UGG	1/1	100	DLNA	9.47	9.47(b)	S30B004		NSA	NA
gamma-CHLORDANE	UGG	1/1	100	DLNA	12.8	12.8(b)	S30B004		NSA	NA
Other Inorganics										
NITRATE/NITRITE	UGG	1/2	50	0.6	5.72	5.72(c)	S30A002	9.9	Bkgd	0

(a) – Upper 95 percent confidence limit on the arithmetic mean. Calculated assuming one-half the detection level as the concentration for those samples in which a given analyte was not detected.
(b) – Since the frequency of detection for this chemical is 1/1, the concentration presented is not the 95 percent upper confidence limit, but the concentration detected in the sole sample collected.
(c) – The 95 percent upper confidence limit on the arithmetic mean exceeds the maximum detected concentration; therefore, the maximum detected value is presented (USEPA, 1989b).
– Contaminant of concern
Bkgd – The maximum detected concentration in UMDA background soils (see Section 3.1).
DLNA – Detection level not available. The detection levels could not be ascertained because constituents were detected in all relevant samples.
NA – Not applicable.
NSA – No standard for comparison available.
TAL – Target analyte list.
TCL – Target compound list.
TIC – Tentatively identified compound.
UGG – ug/g
* Replaces original TABLE 3-81 in the Final Baseline RA; Dames & Moore, 1992a.

PCBs, explosives, and nitrite/nitrate. During followup fieldwork, 10 soil samples were collected--four of which are part of the Site 48 soil investigation, but may be impacted by Site 30. These samples were analyzed for TAL metals, TCL BNAs, and TCL pesticides. The occurrence and distribution of analytes detected in Site 30 soil samples are presented in Table 3-81A, and the contaminant selection rationale is summarized in Table 3-3*.

Four of the 20 TAL inorganics detected (Table 3-81A) were found at concentrations exceeding background levels and are selected as contaminants of concern. Three TCL pesticides were also detected (Table 3-81A) and are selected as contaminants of concern. Two TCL semivolatile TICs and two TCL pesticide TICs were detected, but they are not selected as contaminants of concern.

3.7.3* Site 48: Pipe Discharge Area

3.7.3.1* Groundwater. Groundwater contamination is not considered to be likely at this site. No groundwater sampling was planned at Site 48 for the RI or the followup fieldwork.

3.7.3.2* Soil

- Surface Soil (to a depth of 2 feet)--During the original RI fieldwork, three near-surface soil samples were collected from the pipe discharge area and analyzed for TAL inorganics, TCL BNAs, TCL VOAs, TCL pesticides/PCBs, explosives, and nitrite/nitrate. During followup fieldwork, two additional samples were collected and analyzed for TAL metals and TCL pesticides. One of these samples was also analyzed for TCL BNAs. The occurrence and distribution of analytes detected in these samples are presented in Table 3-82*, and the contaminant selection rationale is summarized in Table 3-3*.

TABLE 3-81A

Occurrence and Distribution of Analytes Detected in Surface and Subsurface Soil (to a depth of 10 feet) at Site 30

COMPOUND	UNITS	Frequency of Detection	Percent Positive Detections	Range of Sample Detection Limits	Range of Detected Concentrations	Upper 95 Percent Confidence Limit (a)	Location of Max. Conc.	Comparison Criteria Concentration	Comparison Criteria Type	Number of Exceedances
TAL Inorganics										
ALUMINUM	UGG	12/12	100	DLNA	3160 – 6300	5060	S30A002	8604	Bkgd	0
ARSENIC	UGG	12/12	100	DLNA	1.09 – 2.76	1.97	S30B003	5.24	Bkgd	0
BARIUM	UGG	12/12	100	DLNA	59 – 142	109	S48B005	233	Bkgd	0
BERYLLIUM	UGG	4/12	33	0.5 – 1.86	0.608 – 1	0.723	S30B004	1.86	Bkgd	0
CADMIUM	UGG	3/12	25	0.7 – 3.05	1.08 – 3.41	1.41	S30B003	3.05	Bkgd	1
CALCIUM	UGG	12/12	100	DLNA	4300 – 10900	7637	S30B004	29006	Bkgd	0
CHROMIUM	UGG	7/12	58	4.05 – 12.7	5.37 – 20.9	10.7	S30B003	32.7	Bkgd	0
COBALT	UGG	10/12	83	15	7.1 – 11.1	9.01	S30B004	15	Bkgd	0
COPPER	UGG	10/12	83	58.6	11.5 – 45.4	25.8	S30B003	58.6	Bkgd	0
IRON	UGG	12/12	100	DLNA	17800 – 26000	22366	S30A001	26233	Bkgd	0
LEAD	UGG	12/12	100	DLNA	1.94 – 190	109	S30B003	8.37	Bkgd	8
MAGNESIUM	UGG	12/12	100	DLNA	2980 – 6090	4333	S30A002	8585	Bkgd	0
MANGANESE	UGG	12/12	100	DLNA	237 – 526	374	S30A002	874	Bkgd	0
NICKEL	UGG	10/12	83	12.6	4.77 – 12.3	8.58	S30B004	12.6	Bkgd	0
POTASSIUM	UGG	12/12	100	DLNA	399 – 1640	1003	S30A002	2179	Bkgd	0
SILVER	UGG	10/12	83	0.025	0.032 – 0.767	0.393	S30B004	0.038	Bkgd	9
SODIUM	UGG	12/12	100	DLNA	319 – 756	498	S30A001	978	Bkgd	0
THALLIUM	UGG	1/12	8	6.62 – 31.3	8.11	8.11(c)	S30B004	31.3	Bkgd	0
VANADIUM	UGG	12/12	100	DLNA	39.5 – 131	80.5	S30A001	131	Bkgd	0
ZINC	UGG	12/12	100	DLNA	32.8 – 339	176	S30A002	94	Bkgd	5
TCL Semivolatile TICs										
2,6-DIMETHYLUNDECANE	UGG	1/1	100	DLNA	11.2	11.2(b)	S30A001		NSA	NA
DIMETHYLNAPHTHALENES	UGG	1/1	100	DLNA	4.48	4.48(b)	S30A001		NSA	NA
TCL Pesticides/PCBs										
DDD	UGG	5/12	42	0.008	0.025 – 0.246	0.091	S30A001		NSA	NA
DDE	UGG	6/12	50	0.008	0.009 – 0.054	0.021	S48B005		NSA	NA
DDT	UGG	5/12	42	0.007	0.01 – 0.58	0.204	S30B004		NSA	NA

TABLE 3-81A (cont'd)

Occurrence and Distribution of Analytes Detected in Surface and Subsurface Soil (to a depth of 10 feet) at Site 30

COMPOUND	UNITS	Frequency of Detection	Percent Positive Detections	Range of Sample Detection Limits	Range of Detected Concentrations	Upper 95 Percent Confidence Limit (a)	Location of Max. Conc.	Comparison Criteria Concentration	Comparison Criteria Type	Number of Exceedances
TCL Pesticides/PCB TICs										
alpha-CHLORDANE	UGG	1/1	100	DLNA	9.47	9.47(b)	S30B004		NSA	NA
gamma-CHLORDANE	UGG	1/1	100	DLNA	12.8	12.8(b)	S30B004		NSA	NA
Other Inorganics										
NITRATE/NITRITE	UGG	1/2	50	0.6	5.72	5.72(c)	S30A002	9.9	Bkgd	0

(a) – Upper 95 percent confidence limit on the arithmetic mean. Calculated assuming one-half the detection level as the concentration for those samples in which a given analyte was not detected.
(b) – Since the frequency of detection for this chemical is 1/1, the concentration presented is not the 95 percent upper confidence limit, but the concentration detected in the sole sample collected.
(c) – The 95 percent upper confidence limit on the arithmetic mean exceeds the maximum detected concentration; therefore, the maximum detected value is presented (USEPA, 1989b).
– Contaminant of concern.
Bkgd – The maximum detected concentration in UMDA background soils (see Section 3.1).
DLNA – Detection level not available. The detection levels could not be ascertained because constituents were detected in all relevant samples.
NA – Not applicable.
NSA – No standard for comparison available.
TAL – Target analyte list.
TCL – Target compound list.
TIC – Tentatively identified compound.
UGG – ug/g

TABLE 3–82*

Occurrence and Distribution of Analytes Detected in Surface Soil (to a depth of 2 feet) at Site 48

COMPOUND	UNITS	Frequency of Detection	Percent Positive Detections	Range of Sample Detection Limits	Range of Detected Concentrations	Upper 95 Percent Confidence Limit (a)	Location of Max. Conc.	Comparison Criteria Concentration	Comparison Criteria Type	Number of Exceedances
TAL Inorganics										
ALUMINUM	UGG	5/5	100	DLNA	3500 – 6400	6311	S48A003	8604	Bkgd	0
ARSENIC	UGG	5/5	100	DLNA	1.61 – 2.54	2.27	S48A001	5.24	Bkgd	0
BARIUM	UGG	5/5	100	DLNA	52.1 – 193	165	S48A001	233	Bkgd	0
CADMIUM	UGG	1/5	20	0.7 – 3.05	6.47	4.47	S48A001	3.05	Bkgd	1
CALCIUM	UGG	5/5	100	DLNA	3450 – 14000	11293	S48A001	29006	Bkgd	0
CHROMIUM	UGG	2/5	40	12.7	5.02 – 7.59	7.2	S48B005	32.7	Bkgd	0
COBALT	UGG	2/5	40	15	5.57 – 8.76	8.46	S48B005	15	Bkgd	0
COPPER	UGG	3/5	60	58.6	13.3 – 118	82.7	S48A001	58.6	Bkgd	1
IRON	UGG	5/5	100	DLNA	15200 – 24000	23938	S48A003	26233	Bkgd	0
LEAD	UGG	5/5	100	DLNA	52.4 – 97	85.1	S48B004	8.37	Bkgd	5
MAGNESIUM	UGG	5/5	100	DLNA	2690 – 6060	5480	S48A003	8585	Bkgd	0
MANGANESE	UGG	5/5	100	DLNA	170 – 497	429	S48A003	874	Bkgd	0
MERCURY	UGG	3/5	60	0.05	0.077 – 0.85	0.558	S48A001	0.056	Bkgd	3
NICKEL	UGG	2/5	40	12.6	5.84 – 8.63	7.73	S48B005	12.6	Bkgd	0
POTASSIUM	UGG	5/5	100	DLNA	778 – 1600	1505	S48A001	2179	Bkgd	0
SILVER	UGG	5/5	100	DLNA	0.148 – 2.8	2.13	S48A001	0.038	Bkgd	5
SODIUM	UGG	5/5	100	DLNA	250 – 645	645(c)	S48A001	978	Bkgd	0
VANADIUM	UGG	5/5	100	DLNA	40.9 – 123	119	S48A003	131	Bkgd	0
ZINC	UGG	5/5	100	DLNA	55.2 – 467	343	S48A001	94	Bkgd	3
TCL Semivolatile TICs										
DDD	UGG	1/1	100	DLNA	3.08	3.08(b)	S48A002		NSA	NA
HEXADECANOIC ACID	UGG	1/1	100	DLNA	1.05	1.05(b)	S48A001		NSA	NA
TCL Pesticides/PCBs										
DDD	UGG	4/5	80	0.008	0.02 – 7.4	4.83	S48A002		NSA	NA
DDE	UGG	3/5	60	0.008	0.054 – 1.94	1.24	S48A002		NSA	NA
DDT	UGG	4/5	80	0.707	0.048 – 1.46	1.03	S48A001		NSA	NA

TABLE 3-82* (cont'd)
Occurrence and Distribution of Analytes Detected in Surface Soil (to a depth of 2 feet) at Site 48

COMPOUND	UNITS	Frequency of Detection	Percent Positive Detections	Range of Sample Detection Limits	Range of Detected Concentrations	Upper 95 Percent Confidence Limit (a)	Location of Max. Conc.	Comparison Criteria Concentration	Comparison Criteria Type	Number of Exceedances
TCL Pesticides/PCB TICs										
alpha-CHLORDANE	UGG	3/3	100	DLNA	0.008 – 0.033	0.033(c)	S48A002		NSA	NA
gamma-CHLORDANE	UGG	4/4	100	DLNA	0.006 – 0.051	0.048	S48A002		NSA	NA
Other Inorganics										
NITRATE/NITRITE	UGG	3/3	100	DLNA	4.92 – 20	20(c)	S48A001	9.9	Bkgd	2

(a) – Upper 95 percent confidence limit on the arithmetic mean. Calculated assuming one-half the detection level as the concentration for those samples in which a given analyte was not detected.
(b) – Since the frequency of detection for this chemical is 1/1, the concentration presented is not the 95 percent upper confidence limit, but the concentration detected in the sole sample collected.
(c) – The 95 percent upper confidence limit on the arithmetic mean exceeds the maximum detected concentration; therefore, the maximum detected value is presented (USEPA, 1989b).
– Contaminant of concern
Bkgd – The maximum detected concentration in UMDA background soils (see Section 3.1).
DLNA – Detection level not available. The detection levels could not be ascertained because constituents were detected in all relevant samples.
NA – Not applicable.
NSA – No standard for comparison available.
TAL – Target analyte list.
TCL – Target compound list.
TIC – Tentatively identified compound.
UGG – ug/g
* Replaces original TABLE 3-82 in the Final Baseline RA; Dames & Moore, 1992a.

Six of the 19 TAL inorganics detected (Table 3-82*), and nitrite/nitrate, were found at concentrations exceeding background levels and are selected as contaminants of concern. Three TCL pesticides were detected and are selected as contaminants of concern. No TCL VOAs or TCL BNAs were detected, but two TCL BNA TICs (DDD and hexadecanoic acid) and two TCL pesticide TICs (alpha- and gamma-chlordane) were detected in Site 48 soil samples. DDD is selected as a contaminant of concern, because it was detected as a TCL pesticide. Alpha- and gamma-chlordane are not selected as contaminants of concern, because they were not detected during the TCL pesticide analysis--which included analysis for chlordane; therefore, their identification and quantification as TICs are questionable. Furthermore, their estimated concentrations are much less than the three TCL pesticides detected at the site. Hexadecanoic acid is not selected as a contaminant of concern, because no historical or other site information indicates that it may be a site-related compound, its identity and quantitation are questionable, and its estimated concentration is low.

- <u>Surface and Subsurface Soil (to a depth of 10 feet)</u>--During the original RI fieldwork, three samples were collected and analyzed for TAL inorganics, TCL VOAs, TCL BNAs, TCL pesticides/PCBs, explosives, and nitrite/nitrate. During followup fieldwork, six soil samples were collected from this depth interval. All six of the samples were analyzed for TAL inorganics and TCL pesticides; four of the samples were also analyzed for TCL BNAs.

  The occurrence and distribution of analytes detected in these samples are presented in Table 3-82A, and the contaminant selection rationale is summarized in Table 3-3*.

  Six of the 19 metals detected (Table 3-82A), plus nitrite/nitrate, are selected as contaminants of concern, because detected concentrations

TABLE 3-82A
Occurrence and Distribution of Analytes Detected in Surface and Subsurface Soil (to a depth of 10 feet) at Site 48

COMPOUND	UNITS	Frequency of Detection	Percent Positive Detections	Range of Sample Detection Limits	Range of Detected Concentrations	Upper 95 Percent Confidence Limit (a)	Location of Max. Conc.	Comparison Criteria Concentration	Comparison Criteria Type	Number of Exceedances
TAL Inorganics										
ALUMINUM	UGG	9/9	100	DLNA	3480 – 6400	5421	S48A003	8604	Bkgd	0
ARSENIC	UGG	9/9	100	DLNA	1.11 – 2.54	1.92	S48A001	5.24	Bkgd	0
BARIUM	UGG	9/9	100	DLNA	52.1 – 193	135	S48A001	233	Bkgd	0
CADMIUM	UGG	1/9	11	0.7 – 3.05	6.47	2.54	S48A001	3.05	Bkgd	1
CALCIUM	UGG	9/9	100	DLNA	3450 – 14000	8865	S48A001	29006	Bkgd	0
CHROMIUM	UGG	4/9	44	4.05 – 12.7	5.02 – 11	7.62	S48B005	32.7	Bkgd	0
COBALT	UGG	6/9	67	15	5.57 – 9.67	8.38	S48B005	15	Bkgd	0
COPPER	UGG	7/9	78	58.6	11.5 – 118	50.3	S48A001	58.6	Bkgd	1
IRON	UGG	9/9	100	DLNA	14500 – 24000	21833	S48A003	26233	Bkgd	0
LEAD	UGG	9/9	100	DLNA	2.51 – 97	65.9	S48B004	8.37	Bkgd	8
MAGNESIUM	UGG	9/9	100	DLNA	2520 – 6060	4521	S48A003	8585	Bkgd	0
MANGANESE	UGG	9/9	100	DLNA	152 – 497	365	S48A003	874	Bkgd	0
MERCURY	UGG	4/9	44	0.05	0.063 – 0.85	0.304	S48A001	0.056	Bkgd	4
NICKEL	UGG	6/9	67	12.6	4.77 – 8.63	7.05	S48B005	12.6	Bkgd	0
POTASSIUM	UGG	9/9	100	DLNA	503 – 1600	1169	S48A001	2179	Bkgd	0
SILVER	UGG	9/9	100	DLNA	0.032 – 2.8	1.26	S48A001	0.038	Bkgd	8
SODIUM	UGG	9/9	100	DLNA	250 – 645	514	S48A001	978	Bkgd	0
VANADIUM	UGG	9/9	100	DLNA	33.7 – 123	88	S48A003	131	Bkgd	0
ZINC	UGG	9/9	100	DLNA	39.6 – 467	210	S48A001	94	Bkgd	3
TCL Semivolatile TICs										
DDD	UGG	1/1	100	DLNA	3.08	3.08(b)	S48A002		NSA	NA
HEXADECANOIC ACID	UGG	1/1	100	DLNA	1.05	1.05(b)	S48A001		NSA	NA
TCL Pesticides/PCBs										
DDD	UGG	5/9	56	0.008	0.02 – 7.4	2.51	S48A002		NSA	NA
DDE	UGG	3/9	33	0.008	0.054 – 1.94	0.639	S48A002		NSA	NA
DDT	UGG	5/9	56	0.007 – 0.707	0.02 – 1.46	0.565	S48A001		NSA	NA

TABLE 3-82A (cont'd)
Occurrence and Distribution of Analytes Detected in Surface and Subsurface Soil (to a depth of 10 feet) at Site 48

COMPOUND	UNITS	Frequency of Detection	Percent Positive Detections	Range of Sample Detection Limits	Range of Detected Concentrations	Upper 95 Percent Confidence Limit (a)	Location of Max. Conc.	Comparison Criteria Concentration	Comparison Criteria Type	Number of Exceedances
TCL Pesticides/PCB TICs										
alpha-CHLORDANE	UGG	3/3	100	DLNA	0.008 - 0.033	0.033(c)	S48A002		NSA	NA
gamma-CHLORDANE	UGG	4/4	100	DLNA	0.006 - 0.051	0.048	S48A002		NSA	NA
Other Inorganics										
NITRATE/NITRITE	UGG	3/3	100	DLNA	4.92 - 20	20(c)	S48A001	9.9	Bkgd	2

(a) - Upper 95 percent confidence limit on the arithmetic mean. Calculated assuming one-half the detection level as the concentration for those samples in which a given analyte was not detected.
(b) - Since the frequency of detection for this chemical is 1/1, the concentration presented is not the 95 percent upper confidence limit, but the concentration detected in the sole sample collected.
(c) - The 95 percent upper confidence limit on the arithmetic mean exceeds the maximum detected concentration; therefore, the maximum detected value is presented (USEPA, 1989b).
[shaded] - Contaminant of concern
Bkgd - The maximum detected concentration in UMDA background soils (see Section 3.1).
DLNA - Detection level not available. The detection levels could not be ascertained because constituents were detected in all relevant samples.
NA - Not applicable.
NSA - No standard for comparison available.
TAL - Target analyte list.
TCL - Target compound list.
TIC - Tentatively identified compound.
UGG - ug/g

exceeded background levels in at least one sample. Three TCL pesticides were detected and are selected as contaminants of concern. No TCL VOAs or TCL BNAs were detected, but two TCL BNA TICs (DDD and hexadecanoic acid) and two TCL pesticide TICs (alpha- and gamma-chlordane) were detected in Site 48 soil samples. DDD is selected as a contaminant of concern, because it was detected as a TCL pesticide. Alpha- and gamma-chlordane are not selected as contaminants of concern, because they were not identified during the TCL pesticide analysis--which included analysis for chlordane; therefore, their identification and quantification as TICs are questionable. Furthermore, their estimated concentrations are much less than the three TCL pesticides detected at the site. Hexadecanoic acid is not selected as a contaminant of concern, because no historical or other site information indicates that it may be a site-related compound, its identity and quantitation are questionable, and its estimated concentration is low.

3.8* OPERABLE UNIT G: ACTIVE LANDFILL (SITE 11)

3.8.1* Groundwater

During the original RI fieldwork, six new flood gravel monitoring wells (11-1 through 11-6) were installed at this site in addition to the four existing flood gravel monitoring wells (MW-33 through MW-36). Samples were analyzed for TAL inorganics, TCL VOAs, TCL BNAs, explosives, and nitrite/nitrate. Because wells 11-3 and 11-4 appear to be upgradient of Site 11, only the results from wells 11-1, 11-2, 11-5, 11-6, and MW-33 through MW-36 were assessed in selecting groundwater contaminants of concern. During followup fieldwork, wells 11-1, 11-5, and MW-33 through MW-36 were analyzed for TCL VOAs, TCL BNAs, explosives, and nitrite/nitrate. Wells 11-2 and 11-6 were analyzed for explosives and nitrite/nitrate only. The occurrence and distribution of analytes detected in these wells are presented in Table 3-83*, and the contaminant selection rationale is summarized in Table 3-2*.

TABLE 3–83*
Occurrence and Distribution of Analytes Detected in Groundwater at Site 11

COMPOUND	UNITS	Frequency of Detection	Percent Positive Detections	Range of Sample Detection Limits	Range of Detected Concentrations	Upper 95 Percent Confidence Limit (a)	Location of Max. Conc.	Comparison Criteria Concentration	Comparison Criteria Type	Number of Exceedances
TAL Inorganics										
ANTIMONY	UGL	6/20	30	3 – 3.03	3.21 – 7.23	3.3	MW–35	1	Bkgd	6
ARSENIC	UGL	14/20	70	2.54 – 5	2.99 – 20.4	7.51	11–2	1	Bkgd	14
BARIUM	UGL	16/16	100	DLNA	20.1 – 102	67.5	11–1	59	Bkgd	6
CALCIUM	UGL	16/16	100	DLNA	28747 – 70842	49287	11–2	98000	Bkgd	0
CHROMIUM	UGL	13/20	65	6.02 – 37.5	6.34 – 26.6	16.3	MW–35	1	Bkgd	13
COPPER	UGL	7/20	35	8.09	5.47 – 56.1	13.9	11–2	1	Bkgd	7
CYANIDE	UGL	2/20	10	2.5 – 16	20.5 – 22.1	6.36	MW–33		NSA	NA
IRON	UGL	1/16	6	38.8	136	39.5	11–2	110	Bkgd	1
LEAD	UGL	7/20	35	1.26	1.95 – 6.77	2.93	MW–33	5	Bkgd	3
MAGNESIUM	UGL	16/16	100	DLNA	15688 – 58704	37028	11–2	58000	Bkgd	1
MANGANESE	UGL	10/16	63	2.75	3.54 – 40.8	14.1	11–6	140	Bkgd	0
POTASSIUM	UGL	16/16	100	DLNA	815 – 5641	3889	11–2	26000	Bkgd	0
SELENIUM	UGL	19/20	95	5	3.41 – 71.1	34.2	11–2	1	Bkgd	19
SODIUM	UGL	16/16	100	DLNA	21400 – 49057	40072	MW–33	100000	Bkgd	0
VANADIUM	UGL	16/16	100	DLNA	17.3 – 69.5	54.7	11–5		NSA	NA
ZINC	UGL	3/16	19	21.1	28.7 – 75	26.5	11–2	40	Bkgd	2
Explosives										
RDX	UGL	2/28	7	0.63 – 2.11	1.34 – 2.06	1.03	MW–36		NSA	NA
TETRYL	UGL	1/28	4	0.556 – 1.56	2.22	0.627	MW–35		NSA	NA
TCL Volatiles										
CHLOROFORM	UGL	2/26	8	0.5 – 5	0.51 – 3.8	1.09	MW–34		NSA	NA
TOLUENE	UGL	6/26	23	0.5 – 5	0.892 – 4.61	1.42	MW–36		NSA	NA
TRICHLOROFLUOROMETHANE	UGL	3/22	14	1.4	6.71 – 8.02	2.46	MW–34		NSA	NA
TCL Volatile TICs										
TRICHLOROTRIFLUOROETHANE	UGL	3/3	100	DLNA	30	30(c)	11–1		NSA	NA

TABLE 3–83* (cont'd)
Occurrence and Distribution of Analytes Detected in Groundwater at Site 11

COMPOUND	UNITS	Frequency of Detection	Percent Positive Detections	Range of Sample Detection Limits	Range of Detected Concentrations	Upper 95 Percent Confidence Limit (a)	Location of Max. Conc.	Comparison Criteria Concentration	Comparison Criteria Type	Number of Exceedances
TCL Semivolatiles										
24DNT	UGL	1/26	4	4.5 – 10	7.86	3.37	MW–34		NSA	NA
26DNT	UGL	1/26	4	0.79 – 10	0.917	0.917(c)	MW–34		NSA	NA
BIS(2–ETHYLHEXYL) PHTHALATE	UGL	4/26	15	4.8 – 10	4.45 – 18.2	5.22	MW–34		NSA	NA
TCL Semivolatile TICs										
2–Ethylhexanoic acid	UGL	1/1	100	DLNA	10	10(b)	MW–33		NSA	NA
CAPROLACTAM	UGL	6/6	100	DLNA	10 – 300	162	11–2		NSA	NA
CYCLOPENTANONE	UGL	2/2	100	DLNA	8 – 20	20(c)	MW–36		NSA	NA
Other Inorganics										
NITRATE/NITRITE	UGL	28/28	100	DLNA	8800 – 19000	14393	11–2	54000	Bkgd	0

(a) – Upper 95 percent confidence limit on the arithmetic mean. Calculated assuming one–half the detection level as the concentration for those samples in which a given analyte was not detected.
(b) – Since the frequency of detection for this chemical is 1/1, the concentration presented is not the 95 percent upper confidence limit, but the concentration detected in the sole sample collected.
(c) – The 95 percent upper confidence limit on the arithmetic mean exceeds the maximum detected concentration; therefore, the maximum detected value is presented (USEPA, 1989b).
– Contaminant of concern.
Bkgd – The maximum detected concentration in UMDA background groundwater (see Section 3.1).
DLNA – Detection level not available. The detection levels could not be ascertained because constituents were detected in all relevant samples.
NA – Not applicable.
NSA – No standard for comparison available.
TAL – Target analyte list.
TCL – Target compound list.
TIC – Tentatively identified compound.
UGL – ug/l
* Replaces original TABLE 3–83 in the Final Baseline RA; Dames & Moore, 1992a.

Of the 16 TAL inorganics detected (Table 3-83*), 10 are selected as contaminants of concern, because concentrations exceeded background levels. Iron and magnesium are not selected as contaminants of concern, because detected levels only slightly exceeded background levels. Iron was detected in one sample at a concentration of 136 μg/L, while the maximum detected concentration in background groundwater was 110 μg/L. The one detected concentration of 136 μg/L is also well below the secondary maximum contaminant level (SMCL) for iron of 300 μg/L (USEPA, 1991c). Magnesium was detected at a maximum concentration of 58,704 μg/L, while the maximum detected concentration in background groundwater was 58,000 μg/L. These exceedances are not considered to be significant. In addition, iron and magnesium are essential nutrients and are toxic only at very high doses.

Two explosives were detected and are selected as contaminants of concern. Two other explosives were detected as semivolatiles and are also selected as contaminants of concern. The three detected TCL VOAs--chloroform, toluene, and trichlorofluoromethane--are common laboratory contaminants, the detected concentrations were low (maximum of 8 μg/L), and the analytes were generally detected in laboratory blanks at comparable concentrations. Therefore, they are not selected as contaminants of concern.

Four TICs were detected in Site 11 groundwater samples, but they are not selected as contaminants of concern.

3.8.2* Soil

No soil sampling was planned at Site 11 for the RI, or the followup fieldwork, because the composition of fill at this active site is continually changing.

3.9 OPERABLE UNIT H: DEFENSE RE-UTILIZATION MARKETING OFFICE AND OTHER ADMINISTRATION AREA SITES

3.9.1* Site 22: DRMO Area

3.9.1.1* Groundwater. Contamination at Site 22--if any--is expected to be restricted to near-surface soil. No groundwater sampling was planned at Site 22 for the RI or the followup fieldwork.

3.9.1.2* Soil

- Surface Soil (to a depth of 2 feet)--During the original RI fieldwork, 11 shallow soil samples were collected throughout the DRMO in areas where potential soil contamination may exist. The samples were analyzed for TAL inorganics, TCL BNAs, TCL VOAs, TCL pesticides/PCBs, explosives, and TPHC. Because TPHC results do not provide individual contaminant concentrations, they are not useful for quantitative risk assessment and are not considered further. Nineteen additional samples were collected during the followup fieldwork and analyzed for TAL metals and TCL pesticides/PCBs. One sample was also analyzed for TCLP cadmium. The occurrence and distribution of analytes detected in these samples are presented in Table 3-84*, and the contaminant selection rationale is summarized in Table 3-3*.

  Eleven of the 22 TAL inorganics detected (Table 3-84*) are selected as contaminants of concern, because detected concentrations exceeded background levels. Two TCL volatiles--acetone and trichlorofluoromethane--were also detected. Although trichlorofluoromethane was not detected in method blanks associated with the sample set, it is a common laboratory contaminant and it was detected in other laboratory blanks at concentrations exceeding levels detected in site samples. Therefore, it is not included as a contaminant of concern for this site. Acetone is also not selected as a contaminant of concern,

TABLE 3–84A

Occurrence and Distribution of Analytes Detected in Surface and Subsurface Soil (to a depth of 10 feet) at Site 22

COMPOUND	UNITS	Frequency of Detection	Percent Positive Detections	Range of Sample Detection Limits	Range of Detected Concentrations	Upper 95 Percent Confidence Limit (a)	Location of Max. Conc.	Comparison Criteria Concentration	Comparison Criteria Type	Number of Exceedances
TAL Inorganics										
ALUMINUM	UGG	36/36	100	DLNA	2750 – 7330	5834	S22B014	8604	Bkgd	0
ANTIMONY	UGG	4/36	11	3.8 – 7.14	12.2 – 319	27.5	S22A005	3.8	Bkgd	4
ARSENIC	UGG	36/36	100	DLNA	0.924 – 4.31	2.31	S22A007	5.24	Bkgd	0
BARIUM	UGG	36/36	100	DLNA	45.9 – 252	119	S22A006	233	Bkgd	1
BERYLLIUM	UGG	14/36	39	0.5 – 1.86	1.11 – 1.89	1.06	S22B030	1.86	Bkgd	1
CADMIUM	UGG	9/36	25	0.7 – 31	1.16 – 86	8.46	S22A006	3.05	Bkgd	4
CALCIUM	UGG	36/36	100	DLNA	3580 – 14000	5752	S22A011	29006	Bkgd	0
CHROMIUM	UGG	26/36	72	12.7	5.56 – 22.8	9.69	S22A007	32.7	Bkgd	0
COBALT	UGG	25/36	69	15	6.79 – 12.9	8.77	S22B012	15	Bkgd	0
COPPER	UGG	30/36	83	58.6	8.07 – 7400	608	S22A007	58.6	Bkgd	5
IRON	UGG	36/36	100	DLNA	16400 – 32400	22867	S22B012	26233	Bkgd	3
LEAD	UGG	36/36	100	DLNA	1.61 – 9800	802	S22A005	8.37	Bkgd	21
MAGNESIUM	UGG	36/36	100	DLNA	2740 – 5350	4309	S22A009	8585	Bkgd	0
MANGANESE	UGG	36/36	100	DLNA	233 – 502	411	S22A005	874	Bkgd	0
MERCURY	UGG	3/37	8	0.05	0.074 – 1.6	0.142	S22B025	0.056	Bkgd	3
NICKEL	UGG	25/36	69	12.6	5.62 – 10.6	8.5	S22B012	12.6	Bkgd	0
POTASSIUM	UGG	36/36	100	DLNA	285 – 2720	1405	S22A001	2179	Bkgd	1
SILVER	UGG	18/36	50	0.025	0.03 – 0.805	0.132	S22A007	0.038	Bkgd	14
SODIUM	UGG	36/36	100	DLNA	274 – 618	387	S22B012	978	Bkgd	0
THALLIUM	UGG	17/36	47	6.62 – 31.3	10.9 – 35	16.2	S22B024	31.3	Bkgd	1
VANADIUM	UGG	36/36	100	DLNA	43.3 – 98.1	77.4	S22A009	131	Bkgd	0
ZINC	UGG	36/36	100	DLNA	41.5 – 2620	450	S22A008	94	Bkgd	11
TCL Volatiles										
ACETONE	UGG	1/11	9	0.017	0.02	0.011	S22A004		NSA	NA
TRICHLOROFLUOROMETHANE	UGG	9/11	82	0.006	0.006 – 0.015	0.012	S22A005		NSA	NA
TCL Volatile TICs										
TRICHLOROTRIFLUOROETHANE	UGG	2/2	100	DLNA	0.011	0.011(c)	S22A005		NSA	NA

TABLE 3–84* (cont'd)
Occurrence and Distribution of Analytes Detected in Surface Soil (to a depth of 2 feet) at Site 22

COMPOUND	UNITS	Frequency of Detection	Percent Positive Detections	Range of Sample Detection Limits	Range of Detected Concentrations	Upper 95 Percent Confidence Limit (a)	Location of Max. Conc.	Comparison Criteria Concentration	Comparison Criteria Type	Number of Exceedances
TCL Semivolatile TICs										
2,6,10,14–TETRAMETHYLPENTADECANE	UGG	1/1	100	DLNA	4.12	4.12(b)	S22A003		NSA	NA
2–CYCLOHEXEN–1–OL	UGG	4/4	100	DLNA	0.205 – 0.312	0.312(c)	S22A008		NSA	NA
2–CYCLOHEXEN–ONE	UGG	3/3	100	DLNA	0.206 – 0.208	0.208(c)	S22A004		NSA	NA
BENZALDEHYDE	UGG	1/1	100	DLNA	0.833	0.833(b)	S22A007		NSA	NA
CYCLOHEXENE OXIDE	UGG	3/3	100	DLNA	0.312 – 0.52	0.52(c)	S22A008		NSA	NA
EICOSANE	UGG	1/1	100	DLNA	8.25	8.25(b)	S22A003		NSA	NA
HENEICOSANE	UGG	1/1	100	DLNA	8.25	8.25(b)	S22A003		NSA	NA
NONADECANE	UGG	1/1	100	DLNA	6.19	6.19(b)	S22A003		NSA	NA
TCL Pesticides/PCBs										
DDD	UGG	3/30	10	0.008	0.014 – 0.374	0.039	S22A004		NSA	NA
DDE	UGG	10/30	33	0.008	0.008 – 0.382	0.05	S22A001		NSA	NA
DDT	UGG	9/30	30	0.007	0.008 – 1.34	0.129	S22A004		NSA	NA

(a) – Upper 95 percent confidence limit on the arithmetic mean. Calculated assuming one–half the detection level as the concentration for those samples in which a given analyte was not detected.
(b) – Since the frequency of detection for this chemical is 1/1, the concentration presented is not the 95 percent upper confidence limit, but the concentration detected in the sole sample collected.
(c) – The 95 percent upper confidence limit on the arithmetic mean exceeds the maximum detected concentration; therefore, the maximum detected value is presented (USEPA, 1989b).
– Contaminant of concern.
Bkgd – The maximum detected concentration in UMDA background soils (see Section 3.1).
DLNA – Detection level not available. The detection levels could not be ascertained because constituents were detected in all relevant samples.
NA – Not applicable.
NSA – No standard for comparison available.
TAL – Target analyte list.
TCL – Target compound list.
TIC – Tentatively identified compound.
UGG – ug/g
* Replaces original TABLE 3–84 in the Final Baseline RA; Dames & Moore, 1992a.

because it was detected in only one soil sample at a concentration just slightly above the detection limit, is a common laboratory contaminant, and also was detected in a laboratory blank at a comparable concentration.

Three pesticides were detected and are selected as contaminants of concern. No explosives compounds were detected. Nine TICs were also detected in Site 22 soil samples, but they are not selected as contaminants of concern.

- Surface and Subsurface Soil (to a depth of 10 feet)--During the original RI fieldwork, 11 soil samples were collected and analyzed for TAL inorganics, TCL VOAs, TCL BNAs, TCL pesticides/PCBs, and explosives. During followup fieldwork, 26 additional samples were collected and analyzed for TAL inorganics and TCL pesticides/PCBs. One sample was also analyzed for cyanide and another for TCLP cadmium. The occurrence and distribution of analytes detected in soil samples are presented in Table 3-84A, and the contaminant selection rationale is summarized in Table 3-3*.

  Twelve of the 22 TAL inorganics detected (Table 3-84A) are selected as contaminants of concern, because detected concentrations exceeded background levels. Two TCL volatiles--acetone and trichlorofluoromethane--were also detected. Although trichlorofluoromethane was not detected in method blanks associated with the sample set, it is a common laboratory contaminant and was detected in other laboratory blanks at concentrations exceeding levels detected in site samples. Therefore, it is not included as a contaminant of concern. Acetone is also not selected as a contaminant of concern, because it was detected in only one soil sample at a concentration just slightly above the detection limit, it is a common laboratory contaminant, and it was detected in a laboratory blank at a comparable concentration.

TABLE 3–84A

Occurrence and Distribution of Analytes Detected in Surface and Subsurface Soil (to a depth of 10 feet) at Site 22

COMPOUND	UNITS	Frequency of Detection	Percent Positive Detections	Range of Sample Detection Limits	Range of Detected Concentrations	Upper 95 Percent Confidence Limit (a)	Location of Max. Conc.	Comparison Criteria Concentration	Comparison Criteria Type	Number of Exceedances
TAL Inorganics										
ALUMINUM	UGG	36/36	100	DLNA	2750 – 7330	5834	S22B014	8604	Bkgd	0
ANTIMONY	UGG	4/36	11	3.8 – 7.14	12.2 – 319	27.5	S22A005	3.8	Bkgd	4
ARSENIC	UGG	36/36	100	DLNA	0.924 – 4.31	2.31	S22A007	5.24	Bkgd	0
BARIUM	UGG	36/36	100	DLNA	45.9 – 252	119	S22A006	233	Bkgd	1
BERYLLIUM	UGG	14/36	39	0.5 – 1.86	1.11 – 1.89	1.06	S22B030	1.86	Bkgd	1
CADMIUM	UGG	9/36	25	0.7 – 31	1.16 – 86	8.46	S22A006	3.05	Bkgd	4
CALCIUM	UGG	36/36	100	DLNA	3580 – 14000	5752	S22A011	29006	Bkgd	0
CHROMIUM	UGG	26/36	72	12.7	5.56 – 22.8	9.69	S22A007	32.7	Bkgd	0
COBALT	UGG	25/36	69	15	6.79 – 12.9	8.77	S22B012	15	Bkgd	0
COPPER	UGG	30/36	83	58.6	8.07 – 7400	608	S22A007	58.6	Bkgd	5
IRON	UGG	36/36	100	DLNA	16400 – 32400	22867	S22B012	26233	Bkgd	3
LEAD	UGG	36/36	100	DLNA	1.61 – 9800	802	S22A005	8.37	Bkgd	21
MAGNESIUM	UGG	36/36	100	DLNA	2740 – 5350	4309	S22A009	8585	Bkgd	0
MANGANESE	UGG	36/36	100	DLNA	233 – 502	411	S22A005	874	Bkgd	0
MERCURY	UGG	3/37	8	0.05	0.074 – 1.6	0.142	S22B025	0.056	Bkgd	3
NICKEL	UGG	25/36	69	12.6	5.62 – 10.6	8.5	S22B012	12.6	Bkgd	0
POTASSIUM	UGG	36/36	100	DLNA	285 – 2720	1405	S22A001	2179	Bkgd	1
SILVER	UGG	18/36	50	0.025	0.03 – 0.805	0.132	S22A007	0.038	Bkgd	14
SODIUM	UGG	36/36	100	DLNA	274 – 618	387	S22B012	978	Bkgd	0
THALLIUM	UGG	17/36	47	6.62 – 31.3	10.9 – 35	16.2	S22B024	31.3	Bkgd	1
VANADIUM	UGG	36/36	100	DLNA	43.3 – 98.1	77.4	S22A009	131	Bkgd	0
ZINC	UGG	36/36	100	DLNA	41.5 – 2620	450	S22A008	94	Bkgd	11
TCL Volatiles										
ACETONE	UGG	1/11	9	0.017	0.02	0.011	S22A004		NSA	NA
TRICHLOROFLUOROMETHANE	UGG	9/11	82	0.006	0.006 – 0.015	0.012	S22A005		NSA	NA
TCL Volatile TICs										
TRICHLOROTRIFLUOROETHANE	UGG	2/2	100	DLNA	0.011	0.011(c)	S22A005		NSA	NA

TABLE 3–84A (cont'd)

Occurrence and Distribution of Analytes Detected in Surface and Subsurface Soil (to a depth of 10 feet) at Site 22

COMPOUND	UNITS	Frequency of Detection	Percent Positive Detections	Range of Sample Detection Limits	Range of Detected Concentrations	Upper 95 Percent Confidence Limit (a)	Location of Max. Conc.	Comparison Criteria Concentration	Comparison Criteria Type	Number of Exceedances
TCL Semivolatile TICs										
2,6,10,14–TETRAMETHYLPENTADECANE	UGG	1/1	100	DLNA	4.12	4.12(b)	S22A003		NSA	NA
2–CYCLOHEXEN–1–OL	UGG	4/4	100	DLNA	0.205 – 0.312	0.312(c)	S22A008		NSA	NA
2–CYCLOHEXEN–ONE	UGG	3/3	100	DLNA	0.206 – 0.208	0.208(c)	S22A004		NSA	NA
BENZALDEHYDE	UGG	1/1	100	DLNA	0.833	0.833(b)	S22A007		NSA	NA
CYCLOHEXENE OXIDE	UGG	3/3	100	DLNA	0.312 – 0.52	0.52(c)	S22A008		NSA	NA
EICOSANE	UGG	1/1	100	DLNA	8.25	8.25(b)	S22A003		NSA	NA
HENEICOSANE	UGG	1/1	100	DLNA	8.25	8.25(b)	S22A003		NSA	NA
NONADECANE	UGG	1/1	100	DLNA	6.19	6.19(b)	S22A003		NSA	NA
TCL Pesticides/PCBs										
DDD	UGG	3/37	8	0.008	0.014 – 0.374	0.032	S22A004		NSA	NA
DDE	UGG	10/37	27	0.008	0.008 – 0.382	0.041	S22A001		NSA	NA
DDT	UGG	9/37	24	0.007	0.008 – 1.34	0.104	S22A004		NSA	NA

(a) – Upper 95 percent confidence limit on the arithmetic mean. Calculated assuming one–half the detection level as the concentration for those samples in which a given analyte was not detected.
(b) – Since the frequency of detection for this chemical is 1/1, the concentration presented is not the 95 percent upper confidence limit, but the concentration detected in the sole sample collected.
(c) – The 95 percent upper confidence limit on the arithmetic mean exceeds the maximum detected concentration; therefore, the maximum detected value is presented (USEPA, 1989b).
– Contaminant of concern
Bkgd – The maximum detected concentration in UMDA background soils (see Section 3.1).
DLNA – Detection level not available. The detection levels could not be ascertained because constituents were detected in all relevant samples.
NA – Not applicable.
NSA – No standard for comparison available.
TAL – Target analyte list.
TCL – Target compound list.
TIC – Tentatively identified compound.
UGG – ug/g

Three pesticides were detected and are selected as contaminants of concern. No explosives were detected. Nine TICs were also detected, but they are not selected as contaminants of concern.

3.9.3* Site 44: Road Oil Application/Disposal Location II

3.9.3.1* Groundwater. Potential contamination at this site is expected to be confined to the upper few feet of soil because of the typical viscosity of road oil. Thus, no groundwater sampling was planned at Site 44 Location II for the RI or the followup fieldwork.

3.9.3.2* Soil

- Surface Soil (to a depth of 2 feet)--During the original RI fieldwork, seven surface soil samples were collected from the general area of road oil application, from the drum storage/oil change area, and from the road oil transfer area--all located in the administration area. These samples were analyzed for TCL VOAs, TCL BNAs, and TCL PCBs. Seven additional samples were collected during the followup fieldwork and analyzed for TAL metals. The occurrence and distribution of analytes detected in these samples are presented in Table 3-86*, and the contaminant selection rationale is summarized in Table 3-3*.

  Two of the 19 TAL inorganics detected (Table 3-86*) are selected as contaminants of concern, because detected concentrations exceeded background concentrations. No TCL VOAs, TCL BNAs, or TCL PCBs were detected in any soil samples. One volatile TIC and three semivolatile TICs were detected (Table 3-86*); however, they are not selected as contaminants of concern.

- Surface and Subsurface Soil (to a depth of 10 feet)--During the original RI fieldwork, seven surface soil samples were collected from this depth interval and analyzed for TCL VOAs, TCL BNAs, and TCL PCBs. During followup fieldwork, nine additional samples were collected and

TABLE 3–86*

Occurrence and Distribution of Analytes Detected in Surface Soil (to a depth of 2 feet) at Site 44, Location II

COMPOUND	UNITS	Frequency of Detection	Percent Positive Detections	Range of Sample Detection Limits	Range of Detected Concentrations	Upper 95 Percent Confidence Limit (a)	Location of Max. Conc.	Comparison Criteria Concentration	Comparison Criteria Type	Number of Exceedances
TAL Inorganics										
ALUMINUM	UGG	7/7	100	DLNA	4560 – 7290	6638	S44B008	8604	Bkgd	0
ARSENIC	UGG	7/7	100	DLNA	1.9 – 2.53	2.47	S44B012	5.24	Bkgd	0
BARIUM	UGG	7/7	100	DLNA	63.5 – 96.5	95.2	S44B008	233	Bkgd	0
BERYLLIUM	UGG	4/7	57	0.5	1.5 – 1.85	1.62	S44B008	1.86	Bkgd	0
CALCIUM	UGG	7/7	100	DLNA	3150 – 3910	3754	S44B008	29006	Bkgd	0
CHROMIUM	UGG	7/7	100	DLNA	6.94 – 17.7	12.4	S44B013	32.7	Bkgd	0
COBALT	UGG	7/7	100	DLNA	7.12 – 8.97	8.91	S44B014	15	Bkgd	0
COPPER	UGG	7/7	100	DLNA	7.28 – 10.3	9.87	S44B009	58.6	Bkgd	0
IRON	UGG	7/7	100	DLNA	19000 – 24200	23170	S44B008	26233	Bkgd	0
LEAD	UGG	7/7	100	DLNA	4.09 – 8.61	6.76	S44B014	8.37	Bkgd	1
MAGNESIUM	UGG	7/7	100	DLNA	2990 – 3890	3778	S44B008	8585	Bkgd	0
MANGANESE	UGG	7/7	100	DLNA	286 – 383	377	S44B008	874	Bkgd	0
NICKEL	UGG	7/7	100	DLNA	7.73 – 9.96	9.22	S44B013	12.6	Bkgd	0
POTASSIUM	UGG	7/7	100	DLNA	1220 – 1660	1487	S44B010	2179	Bkgd	0
SILVER	UGG	4/7	57	0.025	0.036 – 0.978	0.687	S44B011	0.038	Bkgd	3
SODIUM	UGG	7/7	100	DLNA	241 – 352	339	S44B010	978	Bkgd	0
THALLIUM	UGG	4/7	57	6.62	12.3 – 14.7	13.3	S44B009	31.3	Bkgd	0
VANADIUM	UGG	7/7	100	DLNA	60.3 – 79.4	74	S44B008	131	Bkgd	0
ZINC	UGG	6/6	100	DLNA	46.4 – 59.8	56.7	S44B014	94	Bkgd	0
TCL Volatile TICs										
1,1,3–TRIMETHYLCYCLOHEXANE	UGG	1/1	100	DLNA	0.032	0.032(b)	S44A008		NSA	NA
TCL Semivolatile TICs										
2,6,10,14–TETRAMETHYLPENTADECANE	UGG	1/1	100	DLNA	7.19	7.19(b)	S44A007		NSA	NA
2–CYCLOHEXEN–1–OL	UGG	1/1	100	DLNA	0.205	0.205(b)	S44A002		NSA	NA
TOLUENE	UGG	2/2	100	DLNA	1.02 – 1.03	1.03(c)	S44A006		NSA	NA

(a) – Upper 95 percent confidence limit on the arithmetic mean. Calculated assuming one–half the detection level as the concentration for those samples in which a given analyte was not detected.
(b) – Since the frequency of detection for this chemical is 1/1, the concentration presented is not the 95 percent upper confidence limit, but the concentration detected in the sole sample collected.
(c) – The 95 percent upper confidence limit on the arithmetic mean exceeds the maximum detected concentration; therefore, the maximum detected value is presented (USEPA, 1989b).
[shaded] – Contaminant of concern
Bkgd – The maximum detected concentration in UMDA background soils (see Section 3.1).
DLNA – Detection level not available. The detection levels could not be ascertained because constituents were detected in all relevant samples.
NA – Not applicable.
NSA – No standard for comparison available.
TAL – Target analyte list.
TCL – Target compound list.
TIC – Tentatively identified compound.
UGG – ug/g
* Replaces original TABLE 3–86 in the Final Baseline RA; Dames & Moore, 1992a.

analyzed for TAL metals. The occurrence and distribution of analytes detected in these samples are presented in Table 3-86A, and the contaminant selection rationale is summarized in Table 3-3*.

Four of the 19 TAL inorganics detected (Table 3-86A) are selected as contaminants of concern, because detected concentrations exceeded background concentrations. No TCL VOAs, TCL BNAs, or TCL PCBs were detected in any soil samples. One volatile TIC and three semivolatile TICs were detected (Table 3-86A); however, they are not selected as contaminants of concern.

3.11* OPERABLE UNIT J: MISCELLANEOUS UMDA SITES

3.11.1* Site 2: Storage Igloos

3.11.1.1 Groundwater. No groundwater sampling was planned at Site 2 for the RI or the followup fieldwork because of ongoing UMDA monitoring/inspections.

3.11.1.2 Soil. No soil samples were collected at Site 2 during the original RI fieldwork. During followup fieldwork, 18 surface soil samples were collected at the igloos and analyzed for TAL metals, TCL BNAs, and explosives. Because the samples were collected from igloos located throughout the base, it is inappropriate to combine analytical results in an occurrence and distribution table; instead, Table 3-88A summarizes detections and comparison criteria.

Three TAL inorganics--chromium, lead, and zinc--were detected at concentrations exceeding comparison criteria in only one sample. Therefore, these three metals are selected as contaminants of concern only for the area where the sample was collected, between storage igloo blocks H1641 and H1642. The concentration of silver detected in only one sample exceeded background; silver is not selected as a contaminant of concern, because it was detected at this elevated concentration in only one of 19 samples, and its concentration only slightly exceeded background. Bis(2-ethylhexyl)phthalate was detected in only one sample and at a very low concentration. It does not appear to be a site-related chemical based on site

TABLE 3-86A

Occurrence and Distribution of Analytes Detected in Surface and Subsurface Soil (to a depth of 10 feet) at Site 44, Location II

COMPOUND	UNITS	Frequency of Detection	Percent Positive Detections	Range of Sample Detection Limits	Range of Detected Concentrations	Upper 95 Percent Confidence Limit (a)	Location of Max. Conc.	Comparison Criteria Concentration	Comparison Criteria Type	Number of Exceedances
TAL Inorganics										
ALUMINUM	UGG	9/9	100	DLNA	3940 – 9190	7090	S44B008	8604	Bkgd	1
ARSENIC	UGG	9/9	100	DLNA	1.9 – 4.54	3.03	S44B008	5.24	Bkgd	0
BARIUM	UGG	9/9	100	DLNA	63.5 – 110	97	S44B008	233	Bkgd	0
BERYLLIUM	UGG	6/9	67	0.5	1.5 – 1.86	1.67	S44B008	1.86	Bkgd	0
CALCIUM	UGG	9/9	100	DLNA	3150 – 5760	4527	S44B009	29006	Bkgd	0
CHROMIUM	UGG	9/9	100	DLNA	6 – 17.7	11.8	S44B013	32.7	Bkgd	0
COBALT	UGG	9/9	100	DLNA	7.12 – 11.8	9.54	S44B008	15	Bkgd	0
COPPER	UGG	9/9	100	DLNA	7.28 – 18.7	12.4	S44B008	58.6	Bkgd	0
IRON	UGG	9/9	100	DLNA	19000 – 26200	23505	S44B008	26233	Bkgd	0
LEAD	UGG	9/9	100	DLNA	2.59 – 8.61	6.72	S44B014	8.37	Bkgd	1
MAGNESIUM	UGG	9/9	100	DLNA	2990 – 5530	4177	S44B008	8585	Bkgd	0
MANGANESE	UGG	9/9	100	DLNA	281 – 422	380	S44B008	874	Bkgd	0
NICKEL	UGG	9/9	100	DLNA	5.71 – 13.3	10.1	S44B008	12.6	Bkgd	1
POTASSIUM	UGG	9/9	100	DLNA	630 – 1660	1453	S44B010	2179	Bkgd	0
SILVER	UGG	6/9	67	0.025	0.036 – 0.978	0.61	S44B011	0.038	Bkgd	5
SODIUM	UGG	9/9	100	DLNA	241 – 512	387	S44B008	978	Bkgd	0
THALLIUM	UGG	6/9	67	6.62	12.3 – 14.7	13.5	S44B009	31.3	Bkgd	0
VANADIUM	UGG	9/9	100	DLNA	60.3 – 79.4	73.5	S44B008	131	Bkgd	0
ZINC	UGG	8/8	100	DLNA	42.7 – 59.8	55.3	S44B014	94	Bkgd	0
TCL Volatile TICs										
1,1,3-TRIMETHYLCYCLOHEXANE	UGG	1/1	100	DLNA	0.032	0.032(b)	S44A008		NSA	NA
TCL Semivolatile TICs										
2,6,10,14-TETRAMETHYLPENTADECANE	UGG	1/1	100	DLNA	7.19	7.19(b)	S44A007		NSA	NA
2-CYCLOHEXEN-1-OL	UGG	1/1	100	DLNA	0.205	0.205(b)	S44A002		NSA	NA
TOLUENE	UGG	2/2	100	DLNA	1.02 – 1.03	1.03(c)	S44A006		NSA	NA

(a) – Upper 95 percent confidence limit on the arithmetic mean. Calculated assuming one-half the detection level as the concentration for those samples in which a given analyte was not detected.
(b) – Since the frequency of detection for this chemical is 1/1, the concentration presented is not the 95 percent upper confidence limit, but the concentration detected in the sole sample collected.
(c) – The 95 percent upper confidence limit on the arithmetic mean exceeds the maximum detected concentration; therefore, the maximum detected value is presented (USEPA, 1989b).
(shaded) – Contaminant of concern
Bkgd – The maximum detected concentration in UMDA background soils (see Section 3.1).
DLNA – Detection level not available. The detection levels could not be ascertained because constituents were detected in all relevant samples.
NA – Not applicable.
NSA – No standard for comparison available.
TAL – Target analyte list.
TCL – Target compound list.
TIC – Tentatively identified compound.
UGG – ug/g

Table 3-88A
Chemical Analysis Results
Site 2, Storage Igloos

Site 2 Soil Data -- 06/01/93 Page # : 1

MAP ID		S2-1	S2-2	S2-3	S2-4	S2-5	S2-6	S2-7	
SITEID		S02A001	S02A002	S02A003	S02A004	S02A005	S02A006	S02A007	
FIELD ID		UMDBS*1	UMDBS*2	UMDBS*3	UMDBS*4	UMDBS*5	UMDBS*6	UMDBS*7	
S. DATE		03-nov-1992	03-nov-1992	03-nov-1992	03-nov-1992	03-nov-1992	03-nov-1992	03-nov-1992	
DEPTH		0.0	0.0	0.0	0.0	0.0	0.0	0.0	
MATRIX		CSO	CSO	CSO	CSO	CSO	CSO	CSO	COMPARISON
UNITS	*CRLs*	UGG	UGG	UGG	UGG	UGG	UGG	UGG	CRITERIA
TAL Inorganics									
ALUMINUM	*2.35*	3690 B	5980 B	5060 B	5820 B	5080 B	6000 B	6500 B	8604
ARSENIC	*0.25*	2.83	1.63	1.2	1.69	1.5	1.46	1.91	5.24
BARIUM	*5.18*	72.2	86.2	80.8	120	86.1	87.2	92	233
CALCIUM	*100*	4640 B	5000 B	4130 B	5460 B	7200 B	4320 B	6310 B	29006
CHROMIUM	*4.05*	LT 4.05 B	7.4 B	6.19 B	6.84 B	6.29 B	9.41 B	7.94 B	32.7
COBALT	*1.42*	5.87	8.06	6.5	8.2	7.44	7.83	8.99	15
COPPER	*0.965*	7.34 B	9.92 B	7.49 B	9.58 B	8.91 B	21.2	13.2	58.6
IRON	*3.68*	14900	20800	17600	19400	19100	20800	22800	26233
LEAD	*0.177*	5.02	6.4	3.17	4.42	3.9	12	6.68	500
MAGNESIUM	*100*	2720 B	3900 B	3470 B	3840 B	3550 B	3770 B	4560 B	8585
MANGANESE	*2.05*	236	347	301	369	356	346	361	874
NICKEL	*1.71*	5.34	8.45	8.92	9.28	7.55	9.02	9.53	12.6
POTASSIUM	*100*	829 B	1250 B	1120 B	1680	1280 B	1280 B	1240 B	2179
SILVER (GFAA)	*0.025*	0.037	LT 0.025	LT 0.025	LT 0.025	LT 0.025	LT 0.025	[0.043]	0.038
SODIUM	*100*	268 B	349 B	283 B	271 B	289 B	302 B	359 B	978
THALLIUM	*6.62*	9.38	18.1	14.3	16.8	14.3	16.2	18.6	31.3
VANADIUM	*3.39*	41.3	57.2	49.7	50.7	50.8	59.1	62.5	131
ZINC	*8.03*	32.1 B	47.7 B	40.9 B	47.9 B	44.5 B	48.9 B	57	94
Explosives									
	NA	None Detected	None Detected	None Detected	None Detected	None Detected	None Detected	None Detected	NSA
TCL BNAs									
BIS(2-ETHYLHEXYL) PHTHALATE	*0.62*	LT 0.62	LT 0.62	LT 0.62	LT 0.62	LT 0.62	[2]	LT 0.62	NSA
TOTAL UNKNOWN TICs	*NA*	ND	ND	ND	ND	(5)2.4	ND	ND	NSA
Other Compounds									
OIL & GREASE	*NA*	[139 B]	[128 B]	[126 B]	[755]	[197 B]	[218 B]	[153 B]	NSA

Table 3–88A (cont'd)

Chemical Analysis Results
Site 2, Storage Igloos

Site 2 Soil Data -- 06/01/93 Page #: 2

MAP ID		S2–8	S2–9	S2–10	S2–11	S2–12	S2–13	S2–14	
SITEID		S02A008	S02A009	S02A010	S02A011	S02A012	S02A013	S02A014	
FIELD ID		UMDBS*8	UMDBS*9	UMDBS*10	UMDBS*11	UMDBS*12	UMDBS*13	UMDBS*14	
S. DATE		03–nov–1992	04–nov–1992	04–nov–1992	04–nov–1992	04–nov–1992	04–nov–1992	04–nov–1992	
DEPTH		0.0	0.0	0.0	0.0	0.0	0.0	0.0	
MATRIX		CSO	CSO	CSO	CSO	CSO	CSO	CSO	COMPARISON
UNITS	*CRLs*	UGG	UGG	UGG	UGG	UGG	UGG	UGG	CRITERIA
TAL Inorganics									
ALUMINUM	*2.35*	5770 B	5400 B	6100 B	6540 B	4660 B	5230 B	5530 B	8604
ARSENIC	*0.25*	1.25	1.07	1.22	1.31	1.06	1.53	1.26	5.24
BARIUM	*5.18*	79.6	88.9	100	102	122	85.8	93.2	233
CALCIUM	*100*	3590 B	5590 B	6200 B	5270 B	6400 B	5610 B	4800 B	29006
CHROMIUM	*4.05*	7.58 B	5.79 B	8.16 B	7.52 B	LT 4.05 B	[252]	7.84 B	32.7
COBALT	*1.42*	7.75	10.7	9.18	8.36	8.93	11.9	8.43	15
COPPER	*0.965*	7.87 B	11.1 B	11 B	9.98 B	14.2	10.5 B	11.3 B	58.6
IRON	*3.68*	20000	25800	24600	24100	22800	21600	22800	26233
LEAD	*0.177*	5.28	3.96	10.5	4.36	3.48	[1700]	8.13	500
MAGNESIUM	*100*	3530 B	4490 B	4200 B	3860 B	3480 B	3710 B	3780 B	8585
MANGANESE	*2.05*	355	423	381	366	526	389	363	874
NICKEL	*1.71*	8.82	8.96	8.95	8.76	7.28	8.27	9.09	12.6
POTASSIUM	*100*	1190 B	987 B	1160 B	1220 B	773 B	1050 B	1120 B	2179
SILVER (GFAA)	*0.025*	LT 0.025	LT 0.025	LT 0.025	LT 0.025	LT 0.025	LT 0.025	LT 0.025	0.038
SODIUM	*100*	309 B	353 B	339 B	328 B	338 B	321 B	326 B	978
THALLIUM	*6.62*	20.5	24.3	18.9	22	20.9	26.5	18.9	31.3
VANADIUM	*3.39*	59	69.2	72.4	69.6	55.1	63.2	66.7	131
ZINC	*8.03*	45.7 B	54.2	55.1	51.9 B	42.7 B	[411]	51.7 B	94
Explosives	*NA*	None Detected	None Detected	None Detected	None Detected	None Detected	None Detected	None Detected	NSA
TCL BNAs									
BIS(2–ETHYLHEXYL) PHTHALATE	*0.62*	LT 0.62	LT 0.62	LT 0.62	LT 0.62	LT 0.62	LT 0.62	LT 0.62	NSA
TOTAL UNKNOWN TICs	*NA*	(1)0.3	(1)0.4	ND	ND	ND	ND	ND	NSA
Other Compounds									
OIL & GREASE	*NA*	[127 B]	[95.7 B]	[96.5 B]	[126 B]	[84.9 B]	[173 B]	[75.6 B]	NSA

Table 3-88A (cont'd)

Chemical Analysis Results
Site 2, Storage Igloos

Site 2 Soil Data -- 06/01/93 Page #: 3

MAP ID		S2-15	S2-16	S2-17	S2-18	S2-18	
SITEID		S02A015	S02A016	S02A017	S02A018	S02A018D	
FIELD ID		UMDBS*15	UMDBS*16	UMDBS*17	UMDBS*18	UMDBS*19	
S. DATE		04-nov-1992	04-nov-1992	04-nov-1992	04-nov-1992	04-nov-1992	
DEPTH		0.0	0.0	0.0	0.0	0.0	
MATRIX		CSO	CSO	CSO	CSO	CSO	COMPARISON
UNITS	*CRLs*	UGG	UGG	UGG	UGG	UGG	CRITERIA
TAL Inorganics							
ALUMINUM	*2.35*	6250 B	4500 B	5650 B	5770 B	6080 B	8604
ARSENIC	*0.25*	1.18	1.24	1.07	1.25	1.55	5.24
BARIUM	*5.18*	93.5	82.1	88.7	88.2	89	233
CALCIUM	*100*	5400 B	8750 B	4070 B	3880 B	3810 B	29006
CHROMIUM	*4.05*	9.22 B	5.02 B	8.87 B	7.84 B	8.65 B	32.7
COBALT	*1.42*	9.04	8.81	8.63	8.08	8.28	15
COPPER	*0.965*	10.4 B	11.8	9.35 B	8.67 B	8.95 B	58.6
IRON	*3.68*	22700	23800	20800	21300	20900	26233
LEAD	*0.177*	3.8	3.27	11	4.33	4.41	500
MAGNESIUM	*100*	4170 B	3850 B	3700 B	3800 B	4160 B	8585
MANGANESE	*2.05*	369	324	465	348	356	874
NICKEL	*1.71*	10.8	6.76	10.5	9	11.1	12.6
POTASSIUM	*100*	1270 B	711 B	1250 B	1260 B	1340 B	2179
SILVER (GFAA)	*0.025*	LT 0.025	LT 0.025	LT 0.025	LT 0.025	LT 0.025	0.038
SODIUM	*100*	329 B	337 B	313 B	322 B	304 B	978
THALLIUM	*6.62*	18.3	19.8	18.5	23.8	18.2	31.3
VANADIUM	*3.39*	66.2	70	63.3	63.1	60.9	131
ZINC	*8.03*	51.5 B	51.3 B	51.6 B	48.3 B	47.4 B	94
Explosives							
	NA	None Detected	None Detected	None Detected	None Detected	None Detected	NSA
TCL BNAs							
BIS(2-ETHYLHEXYL) PHTHALATE	*0.62*	LT 0.62	LT 3	LT 20	LT 0.62	LT 0.62	NSA
TOTAL UNKNOWN TICs	*NA*	ND	ND	ND	(1)0.6	ND	NSA
Other Compounds							
OIL & GREASE	*NA*	[108 B]	[623]	[757]	[141 B]	[152 B]	NSA

GT = Greater Than
LT = Less Than
NA = Not Available
B = Found in Method Blank

ND = Not Detected
NSA = No Standard Available
NT = Not Tested
= Contaminant of concern

[ ] = Detected concentration exceeds comparison criterion
C = Confirmed Result
U = Unconfirmed Result
Number of unknowns detected shown in parenthesis (), followed by total estimated concentration

history information, and it is a common laboratory contaminant. Therefore, bis(2-ethylhexyl)phthalate is not selected as a contaminant of concern for this site. No explosives were detected. Unknown TICs were detected in four samples, but they are not selected as contaminants of concern.

4.0* ENVIRONMENTAL FATE AND TRANSPORT PROPERTIES

Potential human and environmental exposure to each of the contaminants of concern is influenced by physical/chemical properties and environmental fate and transport properties. A summary of the important physical/chemical and environmental fate parameters for the organic and inorganic contaminants of concern is presented in Table 4-1* of the addendum and in Table 4-2 in the Baseline RA, respectively. These tables include data for the three new contaminants of concern included in this addendum based on followup fieldwork results--benzo(a)pyrene, benzo(g,h,i)perylene, and indeno(1,2,3-cd)pyrene. Fate and transport profiles for the three new contaminants of concern are presented in Appendix C*; profiles for the other contaminants of concern are included in Appendix C of the Baseline RA.

Several of the parameters listed in Tables 4-1* and 4-2 were used to calculate estimated values for other parameters used in the exposure assessment. For example, molecular weight and the octanol-water partition coefficient (K_{ow}) were used to calculate the chemical-specific dermal permeability constant (K_p); the octanol-water partition coefficient was used to calculate plant and animal uptake factors; and Henry's Law constants were used to estimate transfer efficiencies. Other parameters listed in Tables 4-1* and 4-2 (e.g., solubility, vapor pressure, diffusion coefficient, organic carbon partition coefficient, and physical state) are not to be used for risk and hazard calculations, but were useful in predicting potential relevant future exposure pathways and in linking sources to currently contaminated media.

TABLE (

IMPORTANT PHYSICAL AND CHEMICAL PROPERT

	CAS REG. NO.	CHEMICAL FORMULA	USATHAMA ABBR.	MOLECULAR WEIGHT (amu)	COLOR	FREEZING/ MELTING PT. (C)	BOILING POINT (C)	P (
VOA								
Benzene	71-43-2	C6H6	C6H6	78.11	Colorless to light yellow(b1)	5.5(j1)	80.1(j1)	liqu
Tetrachloroethylene	127-18-4	C2Cl4	TCLEE	165.83	Colorless(k1)	-22.4(k1)	121.2(k1)	liqu
1,1,1-Trichloroethane	71-55-6	CH3CCL3	111TCE	133.42	Colorless(k1)	-33(w3)	74(w3)	liqu
Trichloroethylene	79-01-6	C2HCl3	TRCLE	131.39	Colorless(g2)	-87.1(d4)	87.2(v3)	liqu
Xylenes								
o-Xylene	95-47-6	C8H10	12DMB	106.16	Colorless(k1)	-25.2(w3)	144.4(w3)	liqu
m-Xylene	108-38-3	C8H10	13DMB	106.16	Colorless(k1)	-47.9(w3)	139.1(w3)	liqu
p-Xylene	106-42-3	C8H10	14DMB	106.16	Colorless(k1)	13.3(w3)	138.7(w3)	liqu
SVOA								
2-Methylnaphthalene	91-57-6	C11H10	2MNAP	142.21	*	34.58(a1)	241.1(a1)	soli
Anthracene	120-12-7	C14H10	ANTRC	178.23	Colorless crystals, violet fluorescence(a1)	216(r1)	339.9(a1)	soli
Benzo(A)anthracene	56-55-3	C18H12	BAANTR	228.29	Yellow-blue(u1)	162(u1)	400(a1)	soli
*** Benzo(A)pyrene	50-32-8	C20H12	BAPYR	252.32	Pale yellow(l4)	179.3(d1)	495(l4)	soli
Benzo(B)fluoranthene	205-99-2	C20H12	BBFANT	252.3	Colorless(x1)	168.3(x1)	*	soli
*** Benzo(GHI)perylene	191-24-2	C22H12	BGHIPY	276.34	Pale yellow green(l4)	277(l4)	550(l4)	soli
Benzo(K)fluoranthene	207-08-9	C20H12	BKFANT	252.3	Pale yellow(x1)	215.7(x1)	480(x1)	soli
Bis(2-ethylhexyl)phthalate	117-81-7	C24H38O4	B2EHP	390.62	Colorless(b2)	-50(c2)	385(b1)	liqu
Chrysene	218-01-9	C18H12	CHRY	228.3	Colorless w/red and blue fluorescence(i2)	255-256(i2)	448(i2)	rho plat
Di-n-butyl phthalate	84-74-2	C16H22O4	DNBP	278.35	Colorless(b1)	-35(b1)	340(c1)	oily
Dibenzofuran	132-64-9	C12H8O	DBFU	168.19	White(o3)	86-87(u1)	287(u1)	soli
Fluoranthene	206-44-0	C16H10	FANT	202.26	Colorless(a1)	111(q2)	367(a1)	soli
*** Indeno(1,2,3-cd)pyrene	193-39-5	C22H12	ICDPYR	276.34	*	162.5(l4)	530(l4)	soli
N-nitrosodiphenylamine	86-30-6	C12H10N2O	NNDPA	198.24	Yellow to green(k1)(d2)	66.5(r2)	268.17(s2)	crys
Naphthalene	91-20-3	C10H8	NAP	128.19	White(b1)	80.55(q2)	218(c1)	soli
Phenanthrene	58-01-8	C14H10	PHANTR	178.23	Colorless(b1)	101(t2)	339(a1)	soli
Pyrene	129-00-00	C16H10	PYR	202.3	Pale yellow or slight blue(x1)	156(k2)	404(k2)	soli

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TABLE 4-1*

IMPORTANT PHYSICAL AND CHEMICAL PROPERTIES OF THE ORGANIC CONTAMINANTS OF CONCERN

THAMA BBR.	MOLECULAR WEIGHT (amu)	COLOR	FREEZING/ MELTING PT. (C)	BOILING POINT (C)	PHYSICAL STATE (at 20 C)	SOLID/ LIQUID DENSITY at 20 C (g/cm3)	FLASH POINT (C)	SOLUBILITY IN WATER (mg/L at 20 C)	VAPOR PRESSURE (mm Hg at 20 C)	HENI CO (at mole
6H6	78.11	Colorless to light yellow(b1)	5.5(j1)	80.1(j1)	liquid(k1)	0.8765(o1)	-11 (k1)	1780 (b1)	76 (b1)	5.4E
CLEE	165.83	Colorless(k1)	-22.4(k1)	121.2(k1)	liquid(k1)	1.625(k1)	**	150 (p1)	14 (p1)	2.27I
1TCE	133.42	Colorless(k1)	-33(w3)	74(w3)	liquid(k1)	1.325(w3)	*	950(w3)	100(p1)	1.72E
RCLE	131.39	Colorless(g2)	-87.1(d4)	87.2(v3)	liquid(k1)	1.462(v3)	32.2(f3)	1,100(u3)	58.7(v3)	8.92I
2DMB	106.16	Colorless(k1)	-25.2(w3)	144.4(w3)	liquid(k1)	0.8802(w3) at 25 C	31(w3)	0.3(p1)	7(p1)	5.19E
3DMB	106.16	Colorless(k1)	-47.9(w3)	139.1(w3)	liquid(k1)	0.86417(w3) at 25 C	29(w3)	0.3(p1)	9(p1)	7.19E
3DMB	106.16	Colorless(k1)	13.3(w3)	138.7(w3)	liquid(k1)	0.86105(w3) at 25 C	27(w3)	0.3(p1)	9(p1)	7.60E
MNAP	142.21	*	34.58(a1)	241.1(a1)	solid(b1)	1.0058(c1)	97(d1)	24.6(e1);25.4(f1)§	*	
NTRC	178.23	Colorless crystals, violet fluorescence(a1)	216(r1)	339.9(a1)	solid(a1)	1.134@	121(a1)	0.073(f1)§	1.95E-04(r1)	1.45E
ANTR	228.29	Yellow-blue(u1)	162(u1)	400(a1)	solid(w1)	1.274(w1)	*	0.009-0.014(x1)	2.2E-08(w1)	1.0E
APYR	252.32	Pale yellow(l4)	179.3(d1)	495(l4)	solid(l4)	1.174@	*	3.8E-03(l4)§	5.49E-09(r1)	4.37E
FANT	252.3	Colorless(x1)	168.3(x1)	*	solid(u1)	1.174@	*	0.014(y1)	(E-11)-(E-06)(s1)	1.22E
GHIPY	276.34	Pale yellow green(l4)	277(l4)	550(l4)	solid(l4)	1.194@	*	2.6E-04(l4)§	1E-10(l4)++	1.6E-
FANT	252.3	Pale yellow(x1)	215.7(x1)	480(x1)	solid(w1)	1.174@	*	5.5E-04(z1)§	5.0E-07(s1)	3.87E
2EHP	390.62	Colorless(b2)	-50(c2)	385(b1)	liquid(d2)	0.9861(d2)	215(e2)	0.3(f2)§	6.45E-06(f2)++	1.1E-
HRY	228.3	Colorless w/red and blue fluorescence(i2)	255-256(i2)	448(i2)	rhombic plates(i2)	1.274(i2)	*	0.0015-0.0022(x1)	6.3E-09(y1)	1.05E
NBP	278.35	Colorless(b1)	-35(b1)	340(c1)	oily liquid(b1)	1.047(c1)	171(o2)	0.013(s1)	1.0E-05(s1)++	2.0E-
BFU	168.19	White(o3)	86-87(u1)	287(u1)	solid(o2)	1.30@	*	10(t3)§	0.0044(g3)++	9.73E
ANT	202.26	Colorless(a1)	111(q2)	367(a1)	solid(a1)	1.165@	*	0.26(f1)§	0.01(a1)	6.5E-
DPYR	276.34	*	162.5(l4)	530(l4)	solid(l4)	1.194@	*	0.048@§	1E-10(t2)++	2.96E-
NDPA	198.24	Yellow to green(k1)(d2)	66.5(r2)	268.17(s2)	crystals(k1)	1.23(r2)	61(d1)	113(n1)§	6.3E-04(n1)++	1.4E-
NAP	128.19	White(b1)	80.55(q2)	218(c1)	solid(b1)	1.145(c1)	80(a1)	31.7(s1)(w1)	0.0492(s1)	4.6E-
ANTR	178.23	Colorless(b1)	101(t2)	339(a1)	solid(a1)	1.134@	171(u2)	1.29(f1)§	6.8E-04(r1)	2.26E
PYR	202.3	Pale yellow or slight blue(x1)	156(k2)	404(k2)	solid(w1)	1.271(w1)	*	0.125-0.165(x1)	2.5E-06(s1)++	5.1E-

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F THE ORGANIC CONTAMINANTS OF CONCERN

L	SOLID/ LIQUID DENSITY at 20 C (g/cm3)	FLASH POINT (C)	SOLUBILITY IN WATER (mg/L at 20 C)	VAPOR PRESSURE (mm Hg at 20 C)	HENRY'S LAW CONSTANT (atm-m3/ mole at 20 C)	OCTANOL-WATER PARTITION COEFFICIENT (Kow)	ORGANIC-CARBON PARTITION COEFFICIENT (Koc)(mL/g)	DIFFUSION COEFFICIENT IN WATER/AIR (cm2/s at 20 C)
	0.8765(o1)	-11 (k1)	1780 (b1)	76 (b1)	5.4E-03 (l1)	134.90 (m1)	65 (n1)	8.99E-06@/**
	1.625(k1)	**	150 (p1)	14 (p1)	2.27E-02 (l1)	1,380.38 (m1)	665 (q1)	7.59E-06@/**
	1.325(w3)	*	950(w3)	100(p1)	1.72E-02(h4) ~	309(i4)	152(i4)	8.11E-06@/**
	1.462(v3)	32.2(f3)	1,100(u3)	58.7(v3)	8.92E-03(l1)	194.98(a2)	127(n1)	8.43E-06@/**
	0.8802(w3) at 25 C	31(w3)	0.3(p1)	7(p1)	5.19E-03(x3) ~	1,318.26(m1)	129(g1)	7.19E-06@/**
	0.86417(w3) at 25 C	29(w3)	0.3(p1)	9(p1)	7.19E-03(y3) ~	1,584.89(m1)	166(g1)	7.19E-06@/**
	0.86105(w3) at 25 C	27(w3)	0.3(p1)	9(p1)	7.60E-03(y3) ~	1,412.54(m1)	260(z3)	7.19E-06@/**
	1.0058(c1)	97(d1)	24.6(e1);25.4(f1)§	*	*	7,244(i1)	8,511(g1);7,413(h1)	6.43E-06@/**
	1.134@	121(a1)	0.073(f1)§	1.95E-04(r1)	1.45E-03(s1)	28,183.83(r1)	18,621(g1); 25,704(t1)	5.66E-06@/**
	1.274(w1)	*	0.009-0.014(x1)	2.2E-08(w1)	1.0E-06(w1)	4.1E+05(s1)	2.0E+05(s1)	5.11E-06@/**
	1.174@	*	3.8E-03(l4)§	5.49E-09(r1)	4.37E-07@~	1.1E+06(r1)	5.83E+06(l4)	4.94E-06@/**
	1.174@	*	0.014(y1)	(E-11)-(E-06)(s1)	1.22E-05(s1)	1.1E+06(w1)	5.5E+05(s1)	4.78E-06@/**
	1.194@	*	2.6E-04(l4)§	1E-10(l4)++	1.6E-06(l4) ~	1.3E+07(l4)	4.0E+05(l4)	4.79E-06@/**
	1.174@	*	5.5E-04(z1)§	5.0E-07(s1)	3.87E-05(s1)	6.91E+06(a2)	5.5E+05(s1)	4.78E-06@/**
	0.9861(d2)	215(e2)	0.3(f2)§	6.45E-06(f2)++	1.1E-05(f2) ~	7.586E+04(g2)	100,000(h2)	3.32E-06@/**
	1.274(i2)	*	0.0015-0.0022(x1)	6.3E-09(y1)	1.05E-06(y1)	4.1E+05(y1)	2.0E+05(y1)	5.11E-06@/**
1)	1.047(c1)	171(o2)	0.013(s1)	1.0E-05(s1)++	2.0E-07(s1)	3.98E+05(s1)	1.698E+05(s1)	4.22E-06@/**
	1.30@	*	10(t3)§	0.0044(g3)++	9.73E-05(w1)	1.32E+04(w1)	4,600-6,350(n2)	6.12E-6@/**
	1.165@	*	0.26(f1)§	0.01(a1)	6.5E-06(s1)	213,796.21(a2)	9,157@	5.39E-06@/**
	1.194@	*	0.048@§	1E-10(f2)++	2.96E-20(m4)	9.33E+05(m4)	2.0E+04(l4)	4.75E-06@/**
	1.23(r2)	61(d1)	113(n1)§	6.3E-04(n1)++	1.4E-06(n1) ~	1,348.96(m1)	650(n1)	5.13E-06@/**
	1.145(c1)	80(a1)	31.7(s1)(w1)	0.0492(s1)	4.6E-04(s1)	2,344(r1)	933.25(s1)	6.98E-06@/**
	1.134@	171(u2)	1.29(f1)§	6.8E-04(r1)	2.26E-04(s1)	28,840.32(r1)	5,248(g1);22,909(t1); 38,905(v2)	5.85E-06@/**
	1.271(w1)	*	0.125-0.165(x1)	2.5E-06(s1)++	5.1E-06(s1)	8.0E+04(s1)	3.8E+04(s1)	5.61E-06@/**

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TABLE 4–

IMPORTANT PHYSICAL AND CHEMICAL PROPERTIE

	CAS REG. NO.	CHEMICAL FORMULA	USATHAMA ABBR.	MOLECULAR WEIGHT (amu)	COLOR	FREEZING/ MELTING PT. (C)	BOILING POINT (C)	PHYS ST (at 2
PESTICIDES/PCBs								
DDD	72–54–8	C14H10CL4	DDD	320.05	Colorless(k1)	109–110(w1)	193(w1)	crystal
DDE	75–55–9	C14H8Cl4	DDE	318.02	White(r2)	88.4(r2)	*	crystal
DDT	50–29–3	C14H9Cl5	DDT	354.5	Colorless to slightly off–white(e3)	108.5(r2)	260(r2)	crystal powde
Polychlorinated Biphenols PCB 1260	11096–82–5	C12H5Cl5(12%) C12H4Cl6(38%) C12H3Cl7(41%) C12H2Cl8(8%)	PCB260	375.7	Colorless(k1)	*	340–375(i3)	liquid(k
Chlordane	57–74–9	C10H6Cl18	CLDAN	409.8	Brown(w2)	cis:107–108.8; trans:103–105(t2)	175 at 2mmHg(k1)	liquid(k
Dieldrin	60–57–1	C12H8Cl6O	DLDRN	380.93	Buff to light tan(j2)	175–176(j2)	**	solid(j2
Endrin	72–20–8	C12H8Cl6O	ENDRN	380.90	White(w1)	235(s1)	*	solid(w
EXPLOSIVES								
1,3,5–Trinitrobenzene	99–35–4	C6H3N3O6	135TNB	213.12	Yellow(a1)	122(q3)	*	solid(a
1,3–Dinitrobenzene	99–65–0	C6H4N2O4	13DNB	168.11	Yellowish(b1)	89.8(b1)	300–302 at 770 mm Hg(b1)	solid(b
2,4,6–Trinitrotoluene	118–96–7	C7H5N3O6	246TNT	227.13	Colorless(b1)	80.75(b4)	240(b1) (explodes)	solid(b
2,4–Dinitrotoluene	121–14–2	CH3C6H3(NO2)	24DNT	182.15	Yellow(b1)	72(n3)	300(b1)	solid(b
2,6–Dinitrotoluene	606–20–2	CH3C6H3(NO2)	26DNT	182.14	Yellow(m2)	66(n3)	285(m3)	solid(b
HMX	2691–41–0	C4H8N8O8	HMX	296.2	Colorless(k4)	286(n3)	*	solid(n
Nitrobenzene	98–95–3	C6H5NO2	NB	123.11	Yellow(b1)	5.6(t2)	210.8(c1)	liquid(c
RDX	121–82–4	C3H6N6O6	RDX	222.15	White(a1)	205(t3)	*	solid(a
Tetryl	479–45–8	C7H5N5O8	Tetryl	287.17	Yellow(c1)	129.5(n3)	**	solid(c

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TABLE 4-1* (cont'd)

IMPORTANT PHYSICAL AND CHEMICAL PROPERTIES OF THE ORGANIC CONTAMINANTS OF CONCERN

AMA R.	MOLECULAR WEIGHT (amu)	COLOR	FREEZING/ MELTING PT. (C)	BOILING POINT (C)	PHYSICAL STATE (at 20 C)	SOLID/ LIQUID DENSITY at 20 C (g/cm3)	FLASH POINT (C)	SOLUBILITY IN WATER (mg/L at 20 C)	VAPOR PRESSURE (mm Hg at 20 C)	HENRY' CONST (atm- mole at
)	320.05	Colorless(k1)	109-110(w1)	193(w1)	crystals(k1)	1.813@	**	0.16 at 24 C(b1)	(1.3-2.5)E-09 at 30 C(t2)	3.1E-0
E	318.02	White(r2)	88.4(r2)	*	crystalline(r2)	1.492@	*	0.040(b1)	(6.2-6.6)E-06(d3)	1.9E-0
-	354.5	Colorless to slightly off-white(e3)	108.5(r2)	260(r2)	crystals or powder(e3)	1.599@	72.2-77.2(f3)	0.0031-0.0034(b1)§	1.5E-07(e3)	5.13E-
60	375.7	Colorless(k1)	*	340-375(i3)	liquid(k1)	1.873-1.888@	*	0.0027(t2)	4E-05(t2)++	3.4E-
AN	409.8	Brown(w2)	cis:107-108.8; trans:103-105(t2)	175 at 2mmHg(k1)	liquid(k2)	1.59-1.63 at 25 C(k2)	56(a4)	0.056(x2); 1.850(y2)§	1.0E-05(z2)	4.8E-05
IN	380.93	Buff to light tan(j2)	175-176(j2)	**	solid(j2)	1.7@	**	0.186(j2)	3.1E-06(k2)	2.0E-0
RN	380.90	White(w1)	235(s1)	*	solid(w1)	1.7(p2)	27(w1)	0.25(s1)§	2.7E-07(s1)++	4.0E-0
NB	213.12	Yellow(a1)	122(q3)	*	solid(a1)	1.63(r3)	*	385(r3)§	3.03E-06(s3)++	2.21E-0
IB	168.11	Yellowish(b1)	89.8(b1)	300-302 at 770 mm Hg(b1)	solid(b1)	1.575(k3)	*	533(l3)§	1.31E-04(m3)++	5.44E-0
NT	227.13	Colorless(b1)	80.75(b4)	240(b1) (explodes)	solid(b1)	1.65(b4)	*	123(c4)	8.02E-06(f4)	1.1E-08
IT	182.15	Yellow(b1)	72(n3)	300(b1)	solid(b1)	1.521(n3)	207(w1)	280(n3)§	5.1E-03(s1)	1.86E-07
IT	182.14	Yellow(m2)	66(n3)	285(m3)	solid(b1)	1.538(n3)	*	180(s1)	0.018(s1)	4.86E-07
K	296.2	Colorless(k4)	286(n3)	*	solid(n3)	1.90(n3)	*	5.0(v1)	3.33E-14(n3)++	2.60E-15
	123.11	Yellow(b1)	5.6(t2)	210.8(c1)	liquid(c1)	1.20(b1) at 25 C	87.7(o2)	1,900(b1)	~~0.15(b4)~~	1.53E-0
K	222.15	White(a1)	205(t3)	*	solid(a1)	1.83(n3)	*	60(t3)§	4.03E-09(s3)(r3)++	1.96E-11
yl	287.17	Yellow(c1)	129.5(n3)	**	solid(c1)	1.73(n3)	187(c1)	80(n3)§	5.69E-09(n3)++	2.69E-11

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-1* (cont'd)

ES OF THE ORGANIC CONTAMINANTS OF CONCERN

SICAL TATE 20 C)	SOLID/ LIQUID DENSITY at 20 C (g/cm3)	FLASH POINT (C)	SOLUBILITY IN WATER (mg/L at 20 C)	VAPOR PRESSURE (mm Hg at 20 C)	HENRY'S LAW CONSTANT (atm–m3/ mole at 20 C)	OCTANOL–WATER PARTITION COEFFICIENT (Kow)	ORGANIC–CARBON PARTITION COEFFICIENT (Koc)(mL/g)	DIFFUSION COEFFICIENT IN WATER/AIR (cm2/s at 20 C)
ls(k1)	1.813@	**	0.16 at 24 C(b1)	(1.3–2.5)E–09 at 30 C(t2)	3.1E–05(t2) ~	363,078(c3)	240,000(c3)	4.49E–06@/**
lline(r2)	1.492@	*	0.040(b1)	(6.2–6.6)E–06(d3)	1.9E–04(d3) ~	489,778(d3)	257,000(d3)	4.55E–06@/**
ls or er(e3)	1.599@	72.2–77.2(f3)	0.0031–0.0034(b1)§	1.5E–07(e3)	5.13E–04(b3)	2.29E+06(h3)	302,000(c3)	4.32E–06@/**
(k1)	1.873–1.888@	*	0.0027(t2)	4E–05(t2)++	3.4E–04(j3)	1.2E+06–2.0E+09(n1) ~	E+05–E+09(q1)	4.46E–06@/**
(k2)	1.59–1.63 at 25 C(k2)	56(a4)	0.056(x2); 1.850(y2)§	1.0E–05(z2)	4.8E–05(a3) ~	346,736.85(b3)	3,090–43,652#	3.13E–06@/**
j2)	1.7@	**	0.186(j2)	3.1E–06(k2)	2.0E–07(l2)	2.51E+04	1.1E+04@	4.33E–06@/**
w1)	1.7(p2)	27(w1)	0.25(s1)§	2.7E–07(s1)++	4.0E–07(s1)	2.18E+05(s1)	1,698(s1)	4.33E–06@/**
a1)	1.63(r3)	*	385(r3)§	3.03E–06(s3)++	2.21E–09(n3) ~	15.14(n3)	19.95(p3)	7.2E–06 at 25 C(g4)/**
b1)	1.575(k3)	*	533(l3)§	1.31E–04(m3)++	5.44E–08(n3) ~	30.9(n3)	36.31(p3)	7.94E–06 at 25 C(g4)/**
b1)	1.65(b4)	*	123(c4)	8.02E–06(f4)	1.1E–08(n3) ~	100(n3)	524.8(n3)	6.71E–06(n3)/**
b1)	1.521(n3)	207(w1)	280(n3)§	5.1E–03(s1)	1.86E–07(n3) ~	95.50(n3)	251.20(n3); 44.67(s1)	7.31E–06(n3)/**
b1)	1.538(n3)	*	180(s1)	0.018(s1)	4.86E–07(n3) ~	77.62(n3)	77.62(n3);48.98(s1)	7.31E–06(n3)/**
n3)	1.90(n3)	*	5.0(v1)	3.33E–14(n3)++	2.60E–15(n3) ~	1.82(n3)	3.47(n3)	6.02E–06(n3)/**
d(c1)	1.20(b1) at 25 C	87.7(o2)	1,900(b1)	~~0.15(b4)~~	1.53E–05(t2) ~	70.8(t2)	36.31(s1)	7.72E–06@/**
a1)	1.83(n3)	*	60(t3)§	4.03E–09(s3)(r3)++	1.96E–11(n3) ~	7.41(n3)	100(e4)	7.15E–06(n3)/**
c1)	1.73(n3)	187(c1)	80(n3)§	5.69E–09(n3)++	2.69E–11(n3) ~	44.67(n3)	48.98(n3)	5.99E–06(n3)/**

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References for Table 4-1

a1=Sax and Lewis, 1989
b1=Verschueren, 1983
c1=Weast et al., 1985
d1=Aldrich Chemical Co., 1988
e1=Eganhouse and Calder, 1976
f1=Mackay and Shiu, 1977
g1=Abdul et al., 1987
h1=Hodson and Williams, 1988
i1=Yoshida et al., 1983
j1=Weast, 1977
k1=Hawley, 1981
l1=Mackay and Shiu, 1981
m1=Leo, 1983
n1=Arthur D. Little, Inc., 1985
o1=Weast, 1984
p1=Mackison et al., 1981
q1=Means et al., 1982
r1=Radding et al., 1976
s1=Mabey et al., 1982
t1=Karickhoff et al., 1979
u1=Weast et al., 1988
v1=Glover and Hoffsommer, 1973
w1=HSDB, 1988
x1=IARC, 1983
y1=USEPA, 1982
z1=Walton, 1985

a2=Leo et al., 1971
b2=CHRIS, 1978
c2=Patty, 1963
d2=IARC, 1982
e2=NFPA, 1978
f2=Howard, 1989
g2=HSDB, 1987
h2=Neely and Blau, 1985
i2=CRC, 1987
j2=Worthing and Walker, 1983
k2=Windholz, 1983
l2=Thomas, 1982
m2=USPHS, 1989
n2=Karickhoff, 1985
o2=Sax and Lewis, 1987
p2=USEPA, 1980
q2=Cleland and Kingsbury, 1977
r2=TDB, 1984
s2=USEPA, 1987
t2=Callahan et al., 1979
u2=NFPA, 1984
v2=Socha and Carpenter, 1987
w2=Hartley and Kidd, 1983
x2=Sanborn et al., 1976
y2=Weil et al., 1974
z2=Martin, 1972

a3=Suntio et al., 1988
b3=USEPA, 1986
c3=Kadeg et al., 1986
d3=Arthur D. Little, Inc., 1987
e3=Clayton and Clayton, 1981
f3=Weiss, 1986
g3=Chao et al., 1983
h3=Chiou et al., 1982
i3=Sittig, 1981
j3=Burkhard et al., 1985
k3=Weast, 1979
l3=Leiga and Sarmousakis, 1966
m3=Maksimov, 1963
n3=Burrows et al., 1989
o3=Sax, 1979
p3=Lyman and Loreti, 1987
q3=Clark and Hartman, 1941
r3=Urbanski, 1985
s3=Cundall et al., 1981
t3=Banerjee et al., 1980
u3=Pearson and McConnell, 1975
v3=Reid et al., 1977
w3=Grayson and Eckroth, 1978
x3=Sanemasa et al., 1982
y3=SRC, 1988
z3=Vowles and Mantoura, 1987

a4=OHM-TADS, 1988
b4=Linder, 1980
c4=Spanggord et al., 1980a
d4=McNeil, 1979
e4=Rosenblatt, 1986
f4=Pella, 1977
g4=Lyman et al., 1982
h4=Gossett, 1987
i4=Hansch and Leo, 1985
j4=Mabey et al., 1981
k4=USEPA, 1988
l4=TDB, 1984
m4=Montgomery et al., 1990
n4=Hansch et al., 1972
@=Dames & Moore calculation as per Section C.1.2
*=Value was not found during profile preparation
**=Not relevant at normal environmental conditions
§=Solubility in Water (mg/L at 25 C)
++=Vapor Pressure (mm Hg at 25 C)
~=Henry's Law Constant (atm-m3/mole at 25 C)
#=Estimated for pure chlordane by USPHS, 1988, using Equations 4-5 and 4-8 in Lyman et al., 1982

Full references are presented in Appendix C.3.

*Replaces original Table 4-1 in the Final Baseline RA; Dames & Moore, 1992a.

***New contaminant of concern based on followup fieldwork results.

5.0* TOXICITY ASSESSMENT

The purpose of the toxicity assessment is twofold:

- To weigh available evidence regarding the potential for particular contaminants to cause adverse effects in exposed individuals.
- To estimate, where possible, the relationship between the extent of exposure to a contaminant and the increased likelihood or severity of adverse effects.

The definitions and uses of slope factors and reference doses (RfDs) are provided in Section 5.0 of the Baseline RA and are not repeated in the addendum.

Table 5-1* presents available oral and inhalation slope factors and RfDs, as applicable, for the contaminants of concern, including the three new contaminants of concern included in this addendum based on followup fieldwork results--benzo(a)pyrene, benzo(g,h,i)perylene, and indeno(1,2,3-cd)pyrene. Also shown are the weight-of-evidence classification and type of cancer(s) for chemicals with slope factors; and the uncertainty factor, confidence level, and critical effect(s) for chemicals with RfDs.

RfDs are not presented for lead. EPA has determined that the derivation of RfDs for lead is inappropriate (USEPA, 1991d); alternatively, it has developed an uptake/biokinetic (UBK) model that estimates the total lead uptake (micrograms of lead (μg Pb) per day) in children from diet, inhalation, and ingestion of soil, dust, and paint, and predicts a blood lead level (μg Pb per deciliter (dL)) based on total lead uptake. Blood lead is considered to be the best indicator of recent lead exposure and is reliably correlated with neurotoxicity measures in developing children (see the toxicity profile for lead in Appendix D of the Baseline RA). Therefore, the UBK model is used to assess potential exposure to lead at UMDA sites. This model is discussed in more detail in Section 7.0 of the Baseline RA.

TABLE 5-1*

Summary of Toxicity Criteria for the Contaminants of Concern

Chemicals	RfDo (mg/kg/day)	UF	Confidence	Critical Effect	RfDi (mg/kg/day)(aa)	UF	Confidence	Critical Effect
TAL Inorganics								
Aluminum	1E+00	100	Medium	Developmental neurotoxicity	ND	--	--	--
Antimony	4.0E-04	1000	Low	Longevity; blood glucose levels; serum cholesterol	ND	--	--	--
Arsenic	3.0E-04	3	Medium	Hyperpigmentation, keratosis vascular complications	UR	--	--	--
Barium	7.0E-02	3	Medium	Hypertension	1.4E-04	1000	--	Fetotoxicity
Beryllium	5.0E-03	100	Low	NOAEL; highest level tested	ND	--	--	--
Cadmium	5.0E-04(b) 1.0E-03(b)	10	High	Proteinurea	UR	--	--	--
Calcium	ND	--	--	--	ND	--	--	--
Chromium III(c)	1.0E+00	100(d)	Low	NOAEL; highest level tested	6.0E-07	1000	--	Nasal mucosal atrophy
Chromium VI(c)	5.0E-03	500	Low	NOAEL; highest level tested	6.0E-07	1000	--	Nasal mucosal atrophy
Cobalt	1.0E-05	--	Low	Toxicity assessment in sensitive humans	2.86E-04	--	Low	--
Copper	3.7E-02	1	Low	MCL	ID	--	--	--
Iron	ND	--	--	--	ID	--	--	--
Lead	IUBK Model (see text)			Neurotoxicity in children	ID	--	--	--
Magnesium	ID	--	--	--	ID	--	--	--
Manganese	1E-01	1	Medium	Dietary essential level	1.0E-04	300(e)	Medium	Respiratory signs; psychomotor disturbances
Mercury (inorganic)	3.0E-04	1000	--	Renal toxicity	9.0E-05	30	--	Neurotoxicity
Nickel	2.0E-02(f)	300	Medium	Decreased body, liver and spleen weights	UR	--	--	--
Potassium	ID	--	--	--	ID	--	--	--
Selenium	5E-03	3	High	Selenosis: Mottled teeth, blood and CNS disorders	ID	--	--	--
Silver	5E-03	3	Low	Skin discoloration	ID	--	--	--
Sodium	ID	--	--	--	ID	--	--	--
Thallium	8.0E-05(h)	3000	Low	NOAEL; highest level tested	ND	--	--	--
Vanadium	7.0E-03	100	Low	NOAEL; highest level tested	ND	--	--	--
Zinc	2.0E-01(i)	100	--	Anemia	ND	--	--	--
Cyanide (free)	2.0E-02	100(j)	Medium	Weight loss; thyroid effects; demyelination	ND	--	--	--

TABLE 5-1* (cont'd)

Summary of Toxicity Criteria for the Contaminants of Concern

Chemicals	RfDo (mg/kg/day)	UF	Confidence	Critical Effect	RfDi (mg/kg/day)(aa)	UF	Confidence	Critical Effect
Explosives								
1,3,5-Trinitrobenzene	5.0E-05	10,000	Low	By analogy to 1,3-DNB	ND	--	--	--
1,3-Dinitrobenzene	1.0E-04	3000	Low	NOAEL; higher levels associated with inc. spleen weights, hematological and testicular effects	ND	--	--	--
2,4,6-TNT	5.0E-04	1000	Medium	Liver, circulating blood, testicular damage	ND	--	--	--
2,4-DNT	2.0E-03	100	--	NOAEL; higher levels produced anemia, neurological effects, methemoglobinemia, bile duct hyperplasia	ND	--	--	--
2,6-DNT	1.0E-03	3000	--	Mild splenic hematopoeisis; lymphoid depletion	ND	--	--	--
HMX	5.0E-02	1000	Low	NOAEL: higher levels produced hepatotoxicity and nephrotoxicity	ND	--	--	--
RDX	3.0E-03	100	High	NOAEL; higher levels associated with prostate inflammation, tremors, hepatic and renal effects	ND	--	--	--
Nitrobenzene	5.0E-04	10,000	Low	Based on inhalation data	6.0E-04	10,000	Low	Hemolytic anemia; adrenal cortical cell vacuolation
Tetryl	1.0E-02	10,000	Low	Blood coagulation defects; hepatic lesions and necrosis	ND	--	--	--
Other inorganics								
Nitrate(k)	1.6E+00	1	High	NOAEL; higher doses associated with methemoglobinemia	ND	--	--	--
Nitrite	1E-01	10	High	NOAEL; higher doses associated with methemoglobinemia	ND	--	--	--
TCL Volatiles								
Benzene	UR	--	--	--	UR	--	--	--
Tetrachloroethylene	1.0E-02	1000	Medium	Hepatotoxicity/body weight gain decrements	ND	--	--	--
1,1,1-Trichloroethane	9.0E-02(l)	1000	Low	By analogy to inhalation data	3.0E-01(i)	1000	Low	Hepatoxicity
Trichloroethylene	UR	--	--	--	UR	--	--	--
Xylenes (total)	2.0E+00	100	Medium	Hyperactivity; decreased weight gain; mortality	1.0E-01(m)	100	Low	CNS effects; throat and nose irritation

TABLE 5-1* (cont'd)

Summary of Toxicity Criteria for the Contaminants of Concern

	Chemicals	RfDo (mg/kg/day)	UF	Confidence	Critical Effect	RfDi (mg/kg/day)(aa)	UF	Confidence	Critical Effect
	TCL Semi-Volatiles								
	Anthracene	3.0E-01	3000	Low	NOEL	ND	--	--	--
	Benzo(a)anthracene	ND	--	--	--	ND	--	--	--
**	Benzo(a)pyrene	ND	--	--	--	ND	--	--	--
	Benzo(b)fluoranthene	ND	--	--	--	ND	--	--	--
**	Benzo(g,h,i)perylene	ND	--	--	--	ND	--	--	--
	Benzo(k)fluoranthene	ND	--	--	--	ND	--	--	--
	Bis(2-ethylhexyl) phthalate	2.0E-02	1000	Medium	Increased relative liver weights	ND	--	--	--
	Chrysene	ND	--	--	--	ND	--	--	--
	Dibenzofuran	ID	--	--	--	ID	--	--	--
	Di-n-butyl phthalate	1.0E-01	1000	Low	NOAEL; higher doses associated with mortality	ND	--	--	--
	Fluoranthene	4.0E-02	3000	Low	Nephropathy; increased liver wts.; hematological effects	ND	--	--	--
**	Indeno(1,2,3-cd)pyrene	ND	--	--	--	ND	--	--	--
	2-Methylnaphthalene	ID	--	--	--	ID	--	--	--
	Naphthalene	4.0E-02(i)	1,000	Low	Decreased body weight gain	ND	--	--	--
	N-nitrosodiphenylamine	ND	--	--	--	ND	--	--	--
	Phenanthrene	ND	--	--	--	ND	--	--	--
	Pyrene	3.0E-02	3000	Low	Renal tubular pathology; reduced kidney weights	ND	--	--	--
	Pesticides/PCBs								
	Chlordane	6.0E-05	1000	Low	Focal hepatic hypertrophy	UR	--	--	--
	Dieldrin	5.0E-05	100	Medium	Focal hepatic proliferation and hyperplasia; increased liver weights	ND	--	--	--
	DDD	ND	--	--	--	ND	--	--	--
	DDE	ND	--	--	--	ND	--	--	--
	DDT	5.0E-04	100	Medium	Hepatic hypertrophy	ND	--	--	--
	Endrin	3.0E-04	100	Medium	NOAEL; higher doses associated with liver and neurological effects	ND	--	--	--
	PCB 1260	ND	--	--	--	ND	--	--	--

TABLE 5-1* (cont'd)

Summary of Toxicity Criteria for the Contaminants of Concern

Chemicals	SFo 1/(mg/kg/day)	Types of Cancer	SFi 1/(mg/kg/day)	Types of Cancer	Weight-of-Evidence Class	Sources(a)
TAL Inorganics						
Aluminum	ND	--	ND	--	--	10,1,1,1
Antimony	ND	--	ND	--	--	1,1,1,1
Arsenic	1.75E+00	Skin cancers	1.4E+01	Lung cancers	A	1,1,1,1
Barium	ND	--	ND	--	--	1,2,1,1
Beryllium	4.3E+00	Gross tumors, all sites	8.4E+00	Lung cancers	B2	1,1,1,1
Cadmium	ND	--	6.3E+00	Lung, tracheal, and bronchial tumors	B1	1,1,1,1
Calcium	ND	--	ND	Lung tumors	--	-,-,-,-
Chromium III(c)	ND	--	ND	--	--	1,2,1,1
Chromium VI(c)	ND	--	4.2E+01	Lung tumors	A	1,2,1,1
Cobalt	ND	--	ND	--	--	3,3,1,1
Copper	ND	--	ND	--	D	3,1,1,1
Iron	ND	--	ID	--	--	-,-,-,-
Lead	ID	Renal tumors	ID	Digestive tract; respiratory system; peritoneum	B2	4,4,1,1
Magnesium	ID	--	ID	--	--	-,-,-,-
Manganese	ND	--	ND	--	D	1,1,1,1
Mercury (inorganic)	ND	--	ND	--	D	2,2,1,1
Nickel	ND	--	8.4E-01(g) 1.7E+00(g)	Lung and nasal tumors	A	1,1,1,1
Potassium	ID	--	ID	--	--	-,-,-,-
Selenium	ID	--	ID	--	D	1,1,1,1
Silver	ID	--	ID	--	D	1,1,1,1
Sodium	ID	--	ID	--	--	-,-,-,-
Thallium	ID	--	ND	--	D	1,1,1,1
Vanadium	ND	--	ND	--	--	2,1,1,1
Zinc	ND	--	ND	--	D	2,1,1,1
Cyanide (free)	ND	--	ND	--	D	1,1,1,1

TABLE 5-1* (cont'd)

Summary of Toxicity Criteria for the Contaminants of Concern

Chemicals	SFo 1/(mg/kg/day)	Types of Cancer	SFi 1/(mg/kg/day)	Types of Cancer	Weight-of-Evidence Class	Sources(a)
Explosives						
1,3,5-Trinitrobenzene	ND	--	ID	--	--	1,1,1,1
1,3-Dinitrobenzene	ND	--	ID	--	--	1,1,1,1
2,4,6-TNT	3.0E-02	Urinary bladder carcinomas and papillomas	ID	--	C	1,1,1,1
2,4-DNT	6.8E-01	Hepatocellular carcinomas; mammary fibroadenomas	ND	--	B2	5,1,1,1
2,6-DNT	6.8E-01	Hepatocellular carcinomas; mammary fibroadenomas	ND	--	B2	5,1,1,1
HMX	ID	--	ND	--	D	1,1,1,1
RDX	1.1E-01	Hepatocellular carcinomas/ adenomas	ND	--	C	1,1,1,1
Nitrobenzene	ND	--	ND	--	D	1,2,1,1
Tetryl	ND	--	ND	--	--	6,-,-,-
Other inorganics						
Nitrate(k)	ND	--	ND	--	--	1,1,1,1
Nitrite	ND	--	ND	--	--	1,1,1,1
TCL Volatiles						
Benzene	2.9E-02	Leukemia	2.9E-02	Leukemia	A	1,1,1,1
Tetrachloroethylene	5.1E-02	Hepatocellular carcinomas	1.8E-03	Mononuclear cell leukemias and combined liver tumors	UR	1,1,7,7
1,1,1-Trichloroethane	ND	--	ND	--	D	2,2,1,1
Trichloroethylene	1.1E-02	Hepatocellular carcinomas and adenomas	6E-03	Lung tumors	UR	1,1,8,8
Xylenes (total)	ND	--	ND	--	D	2,2,1,1

TABLE 5-1* (cont'd)

Summary of Toxicity Criteria for the Contaminants of Concern

	Chemicals	SFo 1/(mg/kg/day)	Types of Cancer	SFi 1/(mg/kg/day)	Types of Cancer	Weight-of-Evidence Class	Sources(a)
	TCL Semi-Volatiles						
	Anthracene	ID	--	ID	--	D	1,1,1,1
	Benzo(a)anthracene	5.8E+00	By analogy to benzo(a)pyrene	6.1E+00(n)	By analogy to benzo(a)pyrene	B2	1,1,9,9
**	Benzo(a)pyrene	5.8E+00	Forestomach tumors	6.1E+00(n)	Upper respiratory and digestive tumors	B2	1,1,9,9
	Benzo(b)fluoranthene	5.8E+00	By analogy to benzo(a)pyrene	6.1E+00(n)	By analogy to benzo(a)pyrene	B2	1,1,9,9
**	Benzo(g,h,i)perylene	ND	--	ND	--	D	1,1,1,1
	Benzo(k)fluoranthene	5.8E+00	By analogy to benzo(a)pyrene	6.1E+00(n)	By analogy to benzo(a)pyrene	B2	1,1,9,9
	Bis(2-ethylhexyl) phthalate	1.4E-02	Hepatocellular carcinomas/ adenomas	ND	--	B2	1,1,1,1
	Chrysene	5.8E+00	By analogy to benzo(a)pyrene	6.1E+00(n)	By analogy to benzo(a)pyrene	B2	1,1,9,9
	Dibenzofuran	ID	--	ID	--	--	-,-,-,-
	Di-n-butyl phthalate	ND	--	ND	--	--	1,1,1,1
	Fluoranthene	ND	--	ND	--	D	1,1,1,1
**	Indeno(1,2,3-cd)pyrene	5.8E+00	By analogy to benzo(a)pyrene	6.1E+00(n)	By analogy to benzo(a)pyrene	B2	1,1,9,9
	2-Methylnaphthalene	ID	--	ID	--	--	--
	Naphthalene	ND	--	ND	--	D	11,1,1,1
	N-nitrosodiphenylamine	4.9E-03	Bladder tumors	ND	--	B2	1,1,1,1
	Phenanthrene	ND	--	ND	--	D	1,1,1,1
	Pyrene	ND	--	ND	--	D	1,1,1,1
	Pesticides/PCBs						
	Chlordane	1.3E+00	Hepatocellular carcinomas	1.3E+00	By analogy to oral data	B2	1,1,1,1
	Dieldrin	1.6E+01	Various hepatic tumors	1.6E+01	By analogy to oral data	B2	1,1,1,1
	DDD	2.4E-01	Liver tumors	ND	--	B2	1,1,1,1
	DDE	3.4E-01	Hepatocellular carcinomas and hepatomas	ND	--	B2	1,1,1,1
	DDT	3.4E-01	Hepatocellular carcinomas, adenomas; hepatomas	3.4E-01	By analogy to oral data	B2	1,1,1,1
	Endrin	ND	--	ND	--	D	1,1,1,1
	PCB 1260	7.7E+00	Hepatic carcinomas/adenomas; neoplatic nodules	ND	--	B2	1,1,1,1

Table 5-1* (cont'd)

Summary of Toxicity Criteria for the Contaminants of Concern

Footnotes:

(aa) - Inhalation reference doses were calculated from reference air concentrations (RFCs) assuming that a standard 70 kg human inhales 20 cubic meters of air/day (USEPA, 1989b). Limitations of these assumptions are discussed in the uncertainty section of the text.

(a) - Source codes are listed below. The 4 values shown in this column are the sources for the oral RfD, the inhalation RfD, the oral slope factor, and the inhalation slope factor, respectively.

(1) USEPA, 1991d
(2) USEPA, 1991e
(3) USEPA, 1991g
(4) USEPA, 1991k
(5) Brower, 1992
(6) USEPA, 1990
(7) Ris, 1992
(8) Ris, 1991
(9) Poirier, 1992
(10) USEPA, 1992e
(11) USEPA, 1992f

(b) - The oral slope factors are listed for cadmium in water and dietary cadmium, respectively.
(c) - Values for hexavalent chromium are used in this risk assessment.
(d) - A modifying factor of 10 was also used to reflect uncertainty in the data base and the variable absorption of chromium.
(e) - A modifying factor of 3 was also used to account for the uncertainty in manganese exposure levels in the principal study.
(f) - Listed value is for the soluble salts of nickel.
(g) - Listed values are for nickel refinery dust and nickel subsulfide, respectively. Most conservative value (e.g., nickel subsulfide) used in this Baseline RA.
(h) - Value is for thallium as thallium sulfate
(i) - Under RfD/RfC Work Group review.
(j) - A modifying factor of 5 was used to reflect tolerance to cyanide when adminsitered in food.
(k) - Because analysis consisted of total nitrate/nitrite, value for nitrate is used in this baseline RA.
(l) - Has been withdrawn by the RfD/RfC work group
(m) - The RfD/RfC work group has recently classified the inhalation RfC of xylenes as "non-verifiable".
(n) - Under CRAVE work group review
"--" - Not applicable

Acronyms:

RfDo - Oral reference dose
UF - Uncertainty factor
RfDi - Inhalation reference dose
SFo - Oral slope factor
SFi - Inhalation slope factor
ND - No data
ID - Insufficient data available
UR - Under review
NOEL - No observable effect level
NOAEL - No observable adverse effect level (see Appendix B).
MCL - Maximum contaminant level
CNS - Central nervous system
RfC - Reference concentration (see Appendix B)
CRAVE - Carcinogen Risk Assessment Verification Endeavor (see Appendix B)
*- Replaces original Table 5-1 in the final Baseline RA; Dames & Moore, 1992a
**- New contaminant of concern based on followup fieldwork results.

The derivation of toxicity criteria for dermal exposure for contaminants of concern evaluated under dermal absorption exposure pathways is discussed in Section 4.0 of the Baseline RA and is not repeated in this addendum.

Toxicity profiles for the three new contaminants of concern, which discuss the derivation of each of the toxicity parameters, are presented in the toxicity profile for polynuclear aromatic hydrocarbons (PAHs), included in Appendix D of the Baseline RA.

6.0* EXPOSURE ASSESSMENT

The objectives of the exposure assessment, as well as the description of land use scenarios at each site under current and future land use conditions, are discussed in detail in Sections 6.0 and 6.1 of the Baseline RA. The methodology to quantify selected exposure pathways is discussed in Section 6.4 of the Baseline RA and is not repeated herein.

6.2* IDENTIFICATION OF POTENTIAL HUMAN EXPOSURE PATHWAYS

This section discusses the potential pathways by which the human populations identified in Section 6.1 of the Baseline RA may be exposed to contaminants of concern at or originating from the 16 followup fieldwork sites.

The definition of an exposure pathway is included in Section 6.2 of the Baseline RA. Although unchanged from the Baseline RA, Table 6-1*--a list of potential exposure pathways for UMDA--is included herein for informational purposes. The matrix approach used to identify complete pathways for each UMDA site under current and future land use conditions is also described in Section 6.2.

The determination of complete exposure pathways for the followup fieldwork sites under current and future land use conditions is summarized in Sections 6.2.1* and 6.2.2*.

6.2.1* Exposure Pathways Under Current Land Use Conditions

Table 6-2* identifies exposure pathways that are considered to be complete under current land use conditions. The reasons why other pathways are incomplete at UMDA are also summarized. The current exposure pathways are discussed in detail below. Under current land use conditions, two potentially exposed populations exist--onsite receptors (UMDA employees) and offsite receptors (nearby residents). To simplify Table 6-2*, a site-specific pathway is designated as complete by a solid black square if it is complete for <u>one or both</u> populations. Pathways that are complete for only one of the two populations are identified in the discussion below.

TABLE 6-1 *

Preliminary Evaluation of Potential Exposure Pathways for UMDA

	Exposure Pathway	Source	Release Mechanism or Transport Medium	Exposure Route	Potential Receptors: Current Land Use	Potential Receptors: Future Land Use
1	Direct dermal contact with contaminated soil and subsequent absorption of contaminants through skin.	Contaminated Soil	Direct, wind erosion	Direct dermal contact	Onsite: UMDA employees Offsite: None	Onsite: Residential families, construction workers; industrial workers; military personnel; farmers; hunters; trespassers Offsite: None
2	Inadvertent ingestion of contaminated soil.	Contaminated Soil	Direct, wind erosion	Inadvertent ingestion	Onsite: UMDA employees Offsite: None	Onsite: Residential families, construction workers; industrial workers; military personnel; farmers; hunters; trespassers Offsite: None
3	Inhalation of contaminated soil as airborne dust.	Contaminated Soil	Wind erosion; vehicle traffic	Inhalation of dust	Onsite: UMDA employees Offsite: Nearby residents	Onsite: Residential families, construction workers; industrial workers; military personnel; farmers; hunters; trespassers Offsite: Nearby residents
4	Inhalation of vapors volatilized from soil.	Contaminated Soil	Volatilization, wind	Inhalation of vapors	Onsite: UMDA employees Offsite: Nearby residents	Onsite: Residential families, construction workers; industrial workers; military personnel; farmers; hunters; trespassers Offsite: Nearby residents
5	Ingestion of contaminated drinking water.	Contaminated Groundwater	Leaching, advection, dispersion, well	Ingestion	Onsite: UMDA employees Offsite: Nearby residents	Onsite: Residential families, industrial workers; military personnel Offsite: Nearby residents
6	Inhalation of volatile contaminants emitted from groundwater during showering.	Contaminated Groundwater	Leaching, advection, dispersion, well, volatilization, heat, turbulence	Inhalation of vapors	Onsite: UMDA employees Offsite: Nearby residents	Onsite: Residential families Offsite: Nearby residents
7	Direct contact with contaminated groundwater during showering, with subsequent absorption of contaminants through skin.	Contaminated Groundwater	Leaching, advection, dispersion, well	Direct dermal contact	Onsite: UMDA employees Offsite: Nearby residents	Onsite: Residential families Offsite: Nearby residents
8	Dermal absorption of contaminants in groundwater during non-showering use (e.g., irrigating crops or garden).	Contaminated Groundwater	Leaching, advection, dispersion, well	Direct dermal contact	Onsite: None Offsite: Nearby residents; farmers	Onsite: Residential families; construction workers; industrial workers; military personnel; farmers Offsite: Nearby residents

TABLE 6-1* (cont'd)

Preliminary Evaluation of Potential Exposure Pathways for UMDA

Exposure Pathway	Source	Release Mechanism or Transport Medium	Exposure Route	Potential Receptors: Current Land Use	Potential Receptors: Future Land Use
9 Inhalation of vapors during non-showering use of groundwater (e.g., irrigating crops or garden).	Contaminated Groundwater	Volatilization, heat, turbulence	Inhalation of vapors	Onsite: None Offsite: Nearby residents; farmers	Onsite: Residential families; construction workers; industrial workers; military personnel; farmers Offsite: Nearby residents
10 Consumption of game that feed on vegetation that grows in contaminated soil.	Contaminated Soil	Biouptake, animals	Ingestion of game	Onsite: None Offsite: Hunters and their families	Onsite: Hunters and their families Offsite: Hunters and their families
11 Consumption of livestock (or their milk) that feed on vegetation growing in contaminated soil and/or that consume contaminated groundwater.	Contaminated Soil and/or Groundwater	Biouptake, livestock, wells	Ingestion of livestock or milk	Onsite: None Offsite: Nearby residents	Onsite: Residential families Offsite: General public
12 Consumption of crops irrigated by contaminated groundwater and/or grown in contaminated soil.	Contaminated Soil and/or Groundwater	Biouptake, irrigation	Ingestion of crops or products made from crop	Onsite: None Offsite: Nearby residents; general public	Onsite: Residential families Offsite: General public

TABLE 6-2*
Summary of Operable Exposure Pathways at UMDA
Current Land Use Scenario

Site No.	EXPOSURE PATHWAY NUMBERS (SEE TABLE 6-1)											
	1	2	3	4	5	6	7	8	9	10	11	12
1	S,R	R		N	N,T,R	N,T,R	N,T,R	N,T,R	N,T,R	R	T	T
**2	S,R	R		N	N,T,R	N,T,R	N,T,R	N,T,R	N,T,R	R	T	T
3	S,E	S,E	S	N	N,T	N,T	N,T	N,T	N,T	S,R	N,S,T	N,S,T
4 flood gravel (a)	R	R		N	T,R	T,R	T,R	T,R	T,R	R	T	T
4 basalt (a)	R	R		N	T,R	S,T,R	T,R	T,R	S,T,R	R	T	T
**5	R	R		N	N,T,R	N,T,R	N,T,R	N,T,R	N,T,R	R	T	T
6	N	N	N	N	N,T	N,T	N,T	N,T	N,T	N,R	N,T	N,T
7	N,R	N,R	N	N	N,T,R	N,T,R	N,T,R	N,T,R	N,T,R	N,R	N,T	N,T
8 (a)	N,R	S,R	S	N	T,R	T,R	T,R	T,R	T,R	S,R	T	T
9	R	R		N	N,T,R	N,T,R	N,T,R	N,T,R	N,T,R	R	T	T
10	S,R	R		S	N,T,R	N,T,R	N,T,R	N,T,R	N,T,R	R	T	T
**11	N	N	N	N	T	S,T	T	T	S,T	N,R	T	T
**12	R	R		S	T,R	S,T,R	T,R	T,R	S,T,R	R	T	T
13 (a)	R	R	E	N	T,R	S,T,R	S,T,R	S,T,R	S,T,R	R	T	T
14 (a)	S,R	R	E	N	T,R	S,T,R	S,T,R	S,T,R	S,T,R	R	T	T
**15 (a)	R	R		S	T,R	S,T,R	S,T,R	S,T,R	S,T,R	R	T	T
16	E	E		N	T	S,T	T	T	S,T	R	T	T
**17	R	R	E	N	N,T,R	N,T,R	N,T,R	N,T,R	N,T,R	R	T	T
**18	R	R			T,R	S,T,R	S,T,R	S,T,R	S,T,R	R	T	T
**19	R	R		N	T,R	S,T,R	T,R	T,R	S,T,R	R	T	T
21	S,R	R		S	N,T,R	N,T,R	N,T,R	N,T,R	N,T,R	R	T	T
**22				S	N,T	N,T	N,T	N,T	N,T	R	T	T
25 I	S,R	R		N	N,T,R	N,T,R	N,T,R	N,T,R	N,T,R	R	T	T
25 II	S,R	R		N	N,T,R	N,T,R	N,T,R	N,T,R	N,T,R	R	T	T
**26	N,R	R		N	N,T,R	N,T,R	N,T,R	N,T,R	N,T,R	R	T	T
27	E	E		S	N,T	N,T	N,T	N,T	N,T	R	T	T

TABLE 6-2* (cont'd)
Summary of Operable Exposure Pathways at UMDA
Current Land Use Scenario

Site No.	EXPOSURE PATHWAY NUMBERS (SEE TABLE 6-1)											
	1	2	3	4	5	6	7	8	9	10	11	12
29 #420	N,R	N,R	N,R	N	N,T,R	N,T,R	N,T,R	N,T,R	N,T,R	N,R	N,T	N,T
29 #417	N,R	N,R	N,R	N	N,T,R	N,T,R	N,T,R	N,T,R	N,T,R	N,R	N,T	N,T
29 #419	N,R	N,R	N,R	N	N,T,R	N,T,R	N,T,R	N,T,R	N,T,R	N,R	N,T	N,T
29 #486	N,R	N,R	N,R	N	N,T,R	N,T,R	N,T,R	N,T,R	N,T,R	N,R	N,T	N,T
29 #655-1	N,R	N,R	N,R	N	N,T,R	N,T,R	N,T,R	N,T,R	N,T,R	N,R	N,T	N,T
29 #655-2	N,R	N,R	N,R	N	N,T,R	N,T,R	N,T,R	N,T,R	N,T,R	N,R	N,T	N,T
29 #622	N,R	N,R	N,R	N	N,T,R	N,T,R	N,T,R	N,T,R	N,T,R	N,R	N,T	N,T
**30	R	R	E	S	N,T,R	N,T,R	N,T,R	N,T,R	N,T,R	R	T	T
31 (a)	R	R		S	T,R	T,R	T,R	T,R	T,R	R	T	T
32 I	E	E		S	N,T	N,T	N,T	N,T	N,T	R	T	T
32 II	E	E		S	N,T	N,T	N,T	N,T	N,T	R	T	T
33	S,R	S,R	S	N	N,T,R	N,T,R	N,T,R	N,T,R	N,T,R	S,R	N,S,T	N,S,T
34	R	R	E	S	N,T,R	N,T,R	N,T,R	N,T,R	N,T,R	R	T	T
35	R	R	E	N	N,T,R	N,T,R	N,T,R	N,T,R	N,T,R	R	T	T
**36	S,R	R		S	N,T,R	N,T,R	N,T,R	N,T,R	N,T,R	R	T	T
37					N,T	N,T	N,T	N,T	N,T	R	T	T
38 (a)	R	R		N	T,R	S,T,R	S,T,R	S,T,R	S,T,R	R	T	T
39	S,R	R		N	N,T,R	N,T,R	N,T,R	N,T,R	N,T,R	R	T	T
41	R	R		S	T,R	S,T,R	S,T,R	S,T,R	S,T,R	R	T	T
44 I	S,R	S,R	S	S	N,T,R	N,T,R	N,T,R	N,T,R	N,T,R	S,R	N,S,T	N,S,T
**44 II	S,R	R		S	N,T,R	N,T,R	N,T,R	N,T,R	N,T,R	R	T	T
45 (612)	S,R	R		N	N,T	N,T	N,T	N,T	N,T	R	T	T
45 (617)	S,R	R		N	N,T	N,T	N,T	N,T	N,T	R	T	T
46				N	N,T	N,T	N,T	N,T	N,T	R	T	T
**47 (a)	R	R		S	T,R	S,T,R	T,R	T,R	S,T,R	R	T	T
**48	R	R	E	S	N,T,R	N,T,R	N,T,R	N,T,R	N,T,R	R	T	T

TABLE 6-2* (cont'd)
Summary of Operable Exposure Pathways at UMDA
Current Land Use Scenario

EXPOSURE PATHWAY NUMBERS (SEE TABLE 6-1)

Site No.	1	2	3	4	5	6	7	8	9	10	11	12
49	S,R	S,R	S	N	N,T,R	N,T,R	N,T,R	N,T,R	N,T,R	S,R	N,S,T	N,S,T
**50 (a)	N,R	N,R	N	N	T,R	S,T,R	T,R	T,R	S,T,R	N,R	T	T
52	R	R	■	S	N,T,R	N,T,R	N,T,R	N,T,R	N,T,R	R	T	T
53	R	R	■	S	N,T,R	N,T,R	N,T,R	N,T,R	N,T,R	R	T	T
55 (a)	N,R	N,R	N	N	T,R	S,T,R	S,T,R	S,T,R	S,T,R	N,R	T	T
56	S,R	R	E	S	N,T,R	N,T,R	N,T,R	N,T,R	N,T,R	R	T	T
57 I	S,R	R	■	N	T,R	S,T,R	S,T,R	S,T,R	S,T,R	R	T	T
57 II (a)	R	R	■	N	T,R	S,T,R	S,T,R	S,T,R	S,T,R	R	T	T
57 III	S,R	R	■	N	T,R	S,T,R	S,T,R	S,T,R	S,T,R	R	T	T
58	S,R	S,R	S	S	N,T,R	N,T,R	N,T,R	N,T,R	N,T,R	S,R	N,S,T	N,S,T
59	S,R	S,R	S	N	S,T,R	N,T,R	S,T,R	S,T,R	N,T,R	S,R	S,T	S,T
60	S	■	■	N	N,T	N,T	N,T	N,T	N,T	R	T	T
67 (a)	S,R	R	■	N	T,R	S,T,R	T,R	T,R	S,T,R	R	T	T
80	N,R	N,R	N	N	N,T,R	N,T,R	N,T,R	N,T,R	N,T,R	N,R	N,T	N,T
81 I	S,R	R	■	N	N,T,R	N,T,R	N,T,R	N,T,R	N,T,R	R	T	T
81 II	S,R	S,R	S	N	N,T,R	N,T,R	N,T,R	N,T,R	N,T,R	S,R	N,S,T	N,S,T
82	N,R	N,R	N	N	N,T,R	N,T,R	N,T,R	N,T,R	N,T,R	N,R	N,T	N,T

NOTES:

■ - Indicates that exposure pathway is complete at site.

N - Sampling was not performed since the medium and/or chemical were not considered to be of concern. Therefore, no data are available, but the pathway at the site is not likely to be complete.
S - Contaminant source applicable to the specific pathway has been shown to not exist based on sampling results or based on selection of chemicals of concern (See Section 3.0).
T - Transport medium necessary for pathway (e.g., well, for groundwater ingestion) does not exist at the site.
R - Receptor for pathway does not exist at site.
E - Exposure route cannot exist at Sties 3, 16, 27, 32 (Loc. I and II) since it requires dermal contact with soil, and all receptors wear protective equipment, including gloves and face protection. Route cannot exist at Sites 30, 34, 35, 48, and 56 since these sites do not contribute to the top 99% of total dust (see Section 6.3.1.3 and Appendix E).
(a) - Groundwater data were grouped as follows for certain sites since contamination in these wells may originate from any site within the group:
Sites 4, 47, 67 (flood gravel and basalt aquifers)
Sites 8, 31
Sites 13, 57 II
Sites 14, 38
Sites 15, 55
* - Replaces original Table 6-2 in the Final Baseline RA; Dames & Moore, 1992a.
** - Site at which followup fieldwork was conducted.

6.2.1.1* Exposure Pathway 1: Dermal Contact With Contaminated Soil and Subsequent Dermal Absorption. At Sites 6, 7, 29 (septic tanks 420, 417, 419, 486, 622, 655-1, and 655-2), 55, 80, and 82, and followup fieldwork Sites 11 and 50, surface soil contamination is not considered to be probable, and no surface soil sampling was performed. Therefore, pathway 1 is not likely to be complete at these sites, and an "N" is shown in Table 6-2*. According to EPA Region X guidelines (USEPA, 1991b), quantitative information on dermal absorption of inorganics from soil is not available, and dermal absorption is assumed to be negligible (USEPA, 1991c). Therefore, an "S" code is presented for pathway 1 at those sites with only inorganic contaminants of concern in shallow soil (to a depth of 2 feet)--i.e., Sites 1, 10, 14, 21, 25 (Locations I and II), 39, 45 (Locations I and II), 56, 57 (Locations I and III), 60, 67, and 81 (Location I), and followup fieldwork Sites 2, 36, and 44 (Location II). At Sites 3, 33, 44 (Location I), 49, 58, 59, and 81 (Location II), no inorganic or organic contaminants of concern--which could be contacted by potential receptors--are identified in soil; thus, an "S" is shown in Table 6-2*. An "N" is shown for Site 8 and followup fieldwork Site 26, because surface soil at these sites was not analyzed for organic chemicals (which were not expected to be of concern).

- Onsite Land Use--For onsite receptors--with the exception of Sites 37 and 46, and followup fieldwork Site 22--this pathway is incomplete for the sites of concern at UMDA, primarily because no onsite receptors exist to contact the soil (see sites marked with an "R" in Table 6-2*). Security personnel driving on roads and passing by sites seldom leave their vehicles, and the opportunity for them to directly contact soil on any site is extremely small. Therefore, pathway 1 is not complete at sites with security personnel as the only potential receptors. Although receptors are present at Site 3, 16, 27, and 32, pathway 1 is not complete at these sites and is marked with an "E," because gloves, personal protective clothing, and face protection are routinely worn by these receptors, making direct contact and dermal absorption unlikely. The pathway is considered complete for the one employee of the DRMO

Area (Site 22) who may contact the soil during his work outside the DRMO building. In addition, the U.S. Postal Service employee assigned to work near Sites 37 and 46 may occasionally contact the soil at those sites if he works outside of the warehouses.

- Offsite Land Use--Pathway 1 is not complete for current offsite receptors, because they cannot enter the sites to contact the soil.

6.2.1.2* Exposure Pathway 2: Inadvertent Ingestion of Contaminated Soil. The reasons for the "N" code at Sites 6, 7, 29 (septic tanks 420, 417, 419, 486, 622, 655-1, and 655-2), 55, 80, and 82, and followup fieldwork Sites 11 and 50; for the "S" code at Sites 3, 33, 44 (Location I) 49, 58, 59, and 81 (Location II); and for the "E" code at Sites 3, 16, 27, and 32 (Locations I and II) are the same as those presented for pathway 1 (Section 6.2.1.1*). An "S" code is presented for Site 8, because no contaminants of concern are identified for surface soil at this site.

- Onsite Land Use--For onsite receptors, pathway 2 is considered to be complete only for Sites 37, 46, and 60, and followup fieldwork Site 22. At these sites, the receptors discussed in Section 6.1.1 of the Baseline RA may contact the soil and inadvertently ingest contaminants by hand-to-mouth contact. The reasons for the "E" code at Sites 3, 16, 27, and 32 are the same as those discussed for pathway 1 (Section 6.2.1.1*). No onsite receptors are present at other study sites with contaminants of concern, as shown by an "R" in Table 6-2*. Security personnel driving on roads and passing by sites seldom leave their vehicles, and the opportunity for them to directly contact soil on any site is extremely small. Therefore, pathway 2 is not complete at sites with security personnel as the only potential receptors.

- Offsite Land Use--Pathway 2 is not complete for current offsite receptors, because they cannot enter the sites to contact the soil.

6.2.1.3* Exposure Pathway 3: Inhalation of Contaminated Soil as Airborne Dust. The reasons for the "N" code at Sites 6, 7, 29 (septic tanks 420, 417, 419, 486, 622,

655-1, and 655-2), 55, 80, and 82, and followup fieldwork Sites 11 and 50; and for the "S" code at Sites 3, 8, 33, 44 (Location I), 49, 58, 59, and 81 (Location II) are the same as those discussed for pathway 1 (Section 6.2.1.1*).

- Onsite Land Use--Although any of the current employees at UMDA may conceivably inhale contaminated dust generated from sites not marked with an "N" or "S" in Table 6-2*, nine onsite populations are identified to evaluate the completeness of this pathway. These receptors, listed in Table 6-3 of the Baseline RA, are identified based on their proximity to the contaminated sites, and the expected higher frequency and duration of their exposures via pathway 3 compared with those of other onsite personnel. For example, security personnel are not included, because they do not enter any site and generally spend very little time near any site. The laundry worker is identified over other individuals who may be present at Building 419 (e.g., workers eating lunch or changing clothes), because this worker is possibly the only full-time employee in this area and, therefore, is expected to have a much higher probability and magnitude of exposure.

  For the sites not marked with an "N" or "S" in Table 6-2*, air modeling (described in detail in Appendix E of the Baseline RA) is used to identify those at which pathway 3 is complete. Based on air modeling, the contribution of each site with surface soil contamination to the dust levels inhaled by each receptor is calculated, and the sites are ranked according to this contribution. This ranking is also presented in Appendix E of the Baseline RA. Sites that individually contribute to the top 99 percent of the total dust levels reaching a receptor are considered to be sites at which pathway 3 is complete. Table 6-3 of the Baseline RA identifies these sites and is not repeated in this addendum. Although site-specific dust concentrations may not have contributed to the top 99 percent dust level, followup fieldwork Sites 15 and 19 are included for certain receptors if concentrations of contaminants that are

highly toxic via inhalation (e.g., chromium) are expected to contribute significantly to the total risk for the receptor.

Based on this evaluation, Sites 13, 14, 34, 35, and 56, and followup fieldwork Sites 17, 30, and 48, are marked with an "E," indicating that they do not contribute to the top 99 percent of the total dust reaching any of the onsite receptors. For the onsite receptors listed in Table 6-3 of the Baseline RA, pathway 3 is considered to be complete at the remaining sites marked with a black box in Table 6-2*--i.e., Sites 1, 4, 9, 10, 16, 21, 25 (Locations I and II), 27, 31, 32, 37, 38, 39, 41, 45 (Locations I and II), 46, 52, 53, 57 (Locations I, II, and III), 60, 67, and 81 (Location I), and followup fieldwork Sites 2, 5, 12, 15, 18, 19, 22, 26, 36, 44 (Location II), and 47.

- Offsite Land Use--Based on the well survey results discussed in Section 6.1.1.2 of the Baseline RA, offsite residences are located downwind of UMDA. The dominant wind direction in the vicinity is west to east, making residences located along the eastern boundary of UMDA the most likely receptors. For these individuals, this pathway is considered to be complete at all sites except those marked with an "N," "S," or "E." The same air model and approach described above for onsite land use is used to identify sites applicable to offsite residents. These sites are so designated in Table 6-3 of the Baseline RA and are not repeated in this addendum.

  The air model estimates dust levels for an assumed residential location at the eastern boundary of UMDA, because the predominant wind direction is from the west. Dust levels reaching Hermiston are also modeled, because Hermiston is the closest and most highly populated offsite residential cluster in the predominant downwind direction. As discussed in Section 6.1.1.2 of the Baseline RA, several domestic wells are located offsite near the northwestern corner of UMDA. Based on

this information and the proximity of airborne dust-generating activities in the ADA Area in the western part of UMDA, dust levels are also modeled for an assumed residential location along the western UMDA boundary and for residents of Irrigon, located 2 miles to the northwest of UMDA.

6.2.1.4* Exposure Pathway 4: Inhalation of Vapors Volatilized From Soil. For both onsite and offsite receptors, the reasons for the "N" code at Sites 6, 7, 29 (septic tanks 420, 417, 419, 486, 622, 655-1, and 655-2), 55, 80, and 82, and followup fieldwork Sites 11 and 50, are the same as those discussed in Section 6.2.1.1* for pathway 1. In addition, contamination of the surface soil with volatile organic compounds (VOCs) at Sites 1, 3, 4, 8, 9, 13, 14, 16, 25 (Locations I and II), 33, 35, 38, 39, 45 (Locations I and II), 46, 49, 57 (Locations I, II, and III), 59, 60, 67, and 81 (Locations I and II), and followup fieldwork Sites 2, 5, 17, 19, and 26, is not considered to be probable; therefore, VOCs are not included as analytes, and pathway 4 is not likely to be complete (i.e., marked with an "N") at these sites. At Sites 10, 21, 27, 31, 32, 34, 41, 44 (Location I), 52, 53, 56, and 58, and followup fieldwork Sites 12, 15, 22, 30, 36, 44 (Location II), 47, and 48, no VOCs are identified as contaminants of concern in soil samples; therefore, an "S" is presented for pathway 4 at these sites for both onsite and offsite receptors.

- Onsite Land Use--Pathway 4 is considered to be complete for onsite receptors at Site 37 and followup fieldwork Site 18.
- Offsite Land Use--Based on the well survey results discussed in Section 6.1.1.2 of the Baseline RA, offsite residences are located downwind of UMDA. The dominant wind direction in the vicinity is west to east, making residences located along the eastern boundary of UMDA the most likely receptors. For these individuals, this pathway is considered to be complete at Site 37 and followup fieldwork Site 18, the only sites not marked with an "N" or an "S" in Table 6-2*.

The evaluations of exposure pathways 5, 6, 7, 8, and 9 under current land use conditions are not affected by the followup fieldwork and are discussed in Sections 6.2.1.5, 6.2.1.6, 6.2.1.7, 6.2.1.8, and 6.2.1.9, respectively, of the Baseline RA.

6.2.1.10* Exposure Pathway 10: Consumption of Game That Feed on Vegetation Growing in Contaminated Soil. For Sites 6, 7, 29 (septic tanks 420, 417, 419, 486, 622, 655-1, and 655-2), 55, 80, and 82, and followup fieldwork Sites 11 and 50, this pathway is not likely to be complete (i.e., marked with an "N") based on sampling considerations. Because surface soil contamination is not likely at these sites, no soil samples were collected from the depths at which most vegetation is expected to grow (assumed to be 0 to 2 feet). An "S" is presented for Sites 3, 8, 33, 44 (Location I), 49, 58, 59, and 81 (Location II), because no contaminants of concern are identified for this soil depth range.

- Onsite Land Use--No hunting is permitted on any parts of the Depot; therefore, an "R" is shown in Table 6-2* for each site, indicating that this pathway is incomplete because there are no onsite receptors (i.e., hunters).

- Offsite Land Use--UMDA is completely fenced, and the onsite game generally cannot wander offsite; therefore, pathway 10 is not likely to be complete for offsite receptors who hunt in areas surrounding UMDA.

6.2.1.11* Exposure Pathway 11: Consumption of Livestock (or Their Milk) That Feed on Vegetation Growing in Contaminated Soil or Consume Contaminated Groundwater. For Sites 6, 7, 29 (septic tanks 420, 417, 419, 486, 622, 655-1, and 655-2), 80, and 82, an "N" is shown for this pathway, because neither surface soil nor groundwater contamination is considered to be of concern, and pathway 11 is thus not likely to be complete. For Sites 3, 33, 44 (Location I), 49, 58, and 81 (Location II), the "N" code indicates that no groundwater samples were collected, because groundwater contamination is not considered to be of concern; and the "S" code indicates that no surface soil contaminants of concern are identified. The "S" code at Site 59 indicates that neither soil nor groundwater contaminants of concern are identified.

- Onsite Land Use--No farming is currently permitted onsite. Because livestock (which are considered a transport mechanism, conveying contaminants from soil and groundwater to human receptors) are not present at any of the study sites, a "T" is presented in Table 6-2* for onsite receptors.

- Offsite Land Use--Offsite livestock cannot feed on vegetation growing in contaminated soil onsite; however, if downgradient of UMDA, they may drink water that is contaminated with chemicals originating from various UMDA sites. As discussed in Section 6.2.1.5 of the Baseline RA, based on an evaluation of onsite wells located at the boundary of UMDA, significant (i.e., greater than maximum contaminant levels (MCLs) or other comparison criteria) concentrations of site-related contaminants are not likely to be migrating offsite. Therefore, this pathway is not likely to be complete for offsite receptors.

6.2.1.12* Exposure Pathway 12: Consumption of Crops Irrigated by Contaminated Groundwater or Grown in Contaminated Soil. The reasons for the "N" and "S" codes shown at certain sites for this pathway are the same as those discussed in Section 6.2.1.11* for pathway 11.

- Onsite Land Use--As noted in Section 6.2.1.11*, no farming is currently permitted onsite; therefore, there are no crops (the transport mechanism for this pathway) onsite, and a "T" is shown for each site in Table 6-2*.

- Offsite Land Use--Offsite crops downgradient of UMDA may be irrigated by water that is contaminated with chemicals originating from various UMDA sites. As discussed in Sections 6.1.1.2 and 6.2.1.5 of the Baseline RA, irrigation wells are located within 1 mile of the southern boundary of UMDA; however, based on an evaluation of onsite wells located at the boundary of UMDA, significant (i.e., greater than MCLs or other comparison criteria) concentrations of site-related contaminants

are not likely to be migrating offsite. Therefore, this pathway is not likely to be complete for offsite receptors.

6.2.1.13* Other Indirect Pathways. As noted in Section 6.1.1.2 of the Baseline RA, a privately owned apple orchard is located offsite to the north of the ADA Area. It was noted during the RI that onsite vegetation in the northern part of the installation may be stressed, perhaps due to the deposition of contaminated dust (generated from installation site soil), with subsequent biouptake. The apple orchard may also be subject to such deposition and uptake; however, a poplar grove located near the northern installation boundary appears to act as a windbreak. Therefore, the likelihood of receptors being indirectly exposed to site-related soil contaminants via consumption of the apples is low. In addition, sampling identified no explosives contamination in soil near similarly stressed vegetation on UMDA property. Vegetation stress may be due to factors other than contaminant deposition.

6.2.2* Exposure Pathways Under Future Land Use Conditions

As discussed in Section 6.1.2 of the Baseline RA, future uses of UMDA land could include development for residential, industrial, military, agricultural, and recreational (hunting) purposes. The completeness of exposure pathways at the 16 followup fieldwork sites under future onsite land use conditions is discussed below. For simplification, each future land use is considered to be exclusive of the other future land uses (e.g., land developed in the future for agricultural purposes will not be additionally developed for industrial purposes). Offsite populations and land uses in the future are not expected to differ significantly from current ones; therefore, future offsite exposure pathways are expected to be the same as current offsite exposure pathways and are not reevaluated.

6.2.2.1* Future Residential Land Use. Table 6-4* identifies exposure pathways that are considered to be complete under the future residential land use scenario. Also summarized are the reasons why other pathways are incomplete.

TABLE 6-4*
Summary of Operable Exposure Pathways at UMDA
Future Residential Land Use Scenario

Site No.	EXPOSURE PATHWAY NUMBERS (SEE TABLE 6-1)											
	1	2	3	4	5	6	7	8	9	10	11	12
1	S			N	N	N	N	N	N	T		
**2	S			N	N	N	N	N	N	T		
3	S	S	S	N	N	N	N	N	N	S,T	N,S	N,S
4 flood gravel (a)				N						T		
4 basalt (a)				N		S			S	T		
**5				N	N	N	N	N	N	T		
6	N	N	N	N	N	N	N	N	N	N,T	N	N
7	N	N	N	N	N	N	N	N	N	N,T	N	N
8 (a)	N	S	S	N						S,T		
9				N	N	N	N	N	N	T		
10	S			S	N	N	N	N	N	T		
**11	N	N	N	N		S			S	N,T		
**12				S		S			S	T		
13 (a)				N		S	S	S	S	T		
14 (a)	S			N		S	S	S	S	T		
**15 (a)				S		S	S	S	S	T		
16				N		S	S	S	S	T		
**17				N	N	N	N	N	N	T		
**18						S	S	S	S	T		
**19				N		S			S	T		
21	S			S	N	N	N	N	N	T		
**22				S	N	N	N	N	N	T		
25 I	S			N	N	N	N	N	N	T		
25 II	S			N	N	N	N	N	N	T		
**26	N			N	N	N	N	N	N	T		

TABLE 6-4* (cont'd)
Summary of Operable Exposure Pathways at UMDA
Future Residential Land Use Scenario

EXPOSURE PATHWAY NUMBERS (SEE TABLE 6-1)

Site No.	1	2	3	4	5	6	7	8	9	10	11	12
27				S	N	N	N	N	N	T		
29 #420	N	N	N	N	N	N	N	N	N	N,T	N	N
29 #417	N	N	N	N	N	N	N	N	N	N,T	N	N
29 419	N	N	N	N	N	N	N	N	N	N,T	N	N
29 #486	N	N	N	N	N	N	N	N	N	N,T	N	N
29 #655-1	N	N	N	N	N	N	N	N	N	N,T	N	N
29 #655-2	N	N	N	N	N	N	N	N	N	N,T	N	N
29 #622	N	N	N	N	N	N	N	N	N	N,T	N	N
**30				S	N	N	N	N	N	T		
31 (a)				S						T		
32 I				S	N	N	N	N	N	T		
32 II				S	N	N	N	N	N	T		
33	S	S	S	N	N	N	N	N	N	S,T	N,S	N,S
34				S	N	N	N	N	N	T		
35				N	N	N	N	N	N	T		
**36	S			S	N	N	N	N	N	T		
37					N	N	N	N	N	T		
38 (a)				N		S	S	S	S	T		
39	S			N	N	N	N	N	N	T		
41				S		S	S	S	S	T		
44 I	S	S	S	S	N	N	N	N	N	S,T	N,S	N,S
**44 II	S			S	N	N	N	N	N	T		
45 (612)	S			N	N	N	N	N	N	T		
45 (617)	S			N	N	N	N	N	N	T		
46				N	N	N	N	N	N	T		

TABLE 6-4* (cont'd)
Summary of Operable Exposure Pathways at UMDA
Future Residential Land Use Scenario

EXPOSURE PATHWAY NUMBERS (SEE TABLE 6-1)

Site No.	1	2	3	4	5	6	7	8	9	10	11	12
**47 (a)	■	■	■	S	■	■	■	■	■	T	■	■
**48	■	■	■	S	N	N	N	N	N	T	■	■
49	S	S	S	N	N	N	N	N	N	S,T	N,S	N,S
**50 (a)	N	N	N	N	■	S	■	■	S	N,T	■	■
52	■	■	■	S	N	N	N	N	N	T	■	■
53	■	■	■	S	N	N	N	N	N	T	■	■
55 (a)	N	N	N	N	■	S	S	S	S	N,T	■	■
56	S	■	■	S	N	N	N	N	N	T	■	■
57 I	S	■	■	N	■	S	S	S	S	T	■	■
57 II (a)	■	■	■	N	■	S	S	S	S	T	■	■
57 III	S	■	■	N	■	S	S	S	S	T	■	■
58	S	S	S	S	N	N	N	N	N	S,T	N,S	N,S
59	S	S	S	N	S	N	S	S	N	S,T	S	S
60	S	■	■	N	N	N	N	N	N	T	■	■
67 (a)	S	■	■	N	■	■	■	■	■	T	■	■
80	N	N	N	N	N	N	N	N	N	N,T	N	N
81 I	S	■	■	N	N	N	N	N	N	T	■	■
81 II	S	S	S	N	N	N	N	N	N	S,T	N,S	N,S
82	N	N	N	N	N	N	N	N	N	N,T	N	N

NOTES:

■ - Indicates that exposure pathway is complete at site.

N - Sampling was not performed since the medium and/or chemical were not considered to be of concern. Therefore, no data are available, but the pathway at the site is not likely to be complete.

S - Contaminant source applicable to the specific pathway has been shown to not exist based on sampling results or based on selection of chemicals of concern (See Section 3.0).

T - Transport medium necessary for pathway (e.g., well, for groundwater ingestion) does not exist at the site.

(a) - Groundwater data were grouped as follows for certain sites since contamination in these wells may originate from any site within the group:

Sites 4, 47, 67 (flood gravel and basalt aquifers)
Sites 8, 31
Sites 13, 57 II
Sites 14, 38
Sites 15, 55

* - Replaces original Table 6-4 in the Final Baseline RA; Dames & Moore, 1992a.

** - Site at which followup fieldwork was conducted.

- Exposure Pathway 1: Dermal Contact With Contaminated Soil and Subsequent Dermal Absorption--At Sites 6, 7, 29 (septic tanks 420, 417, 419, 486, 622, 655-1, and 655-2), 55, 80, and 82, and followup fieldwork Sites 11 and 50, surface soil contamination is not considered to be probable, and no surface soil was sampled. Therefore, pathway 1 is not likely to be complete at these sites for future residents, and an "N" is shown in Table 6-4*. According to EPA Region X guidelines (USEPA, 1991b), quantitative information on dermal absorption of inorganics from soil is not available, and dermal absorption is assumed to be negligible (USEPA, 1991c). Therefore, an "S" code is shown for pathway 1 at those sites with only inorganic contaminants of concern--i.e., Sites 1, 10, 14, 21, 25 (Locations I and II), 39, 45, 56, 57 (Locations I and III), 60, 67, and 81 (Location I), and followup fieldwork Sites 2, 18, 26, 36, and 44 (Location II). At Sites 3, 33, 44 (Location I), 49, 58, 59, and 81 (Location II), no inorganic or organic contaminants of concern are identified in soil that could be contacted by future residents, and an "S" is shown in Table 6-4*. Surface soil at Site 8 and followup fieldwork Site 26 was not analyzed for organic chemicals, because they are not expected to be of concern; thus, an "N" is shown for these sites.

  Pathway 1 is considered to be complete at the remaining sites for future children and adult residents who may contact the soil during various outdoor activities (e.g., playing, gardening, etc.). (See the solid black box in Table 6-4*).

- Exposure Pathway 2: Inadvertent Ingestion of Contaminated Soil--The reasons for the "N" code at Sites 6, 7, 29 (septic tanks 420, 417, 419, 486, 622, 655-1, and 655-2), 55, 80, and 82, and followup fieldwork Sites 11 and 50; and for the "S" code at Sites 3, 33, 44 (Location I), 49, 58, 59, and 81 (Location II) are the same as those presented above for pathway 1. An "S" code is shown for Site 8, because no contaminants of

concern are identified for surface soil at this site. Pathway 2 is considered to be complete at the remaining sites for future children and adult residents who may contact the soil during various outdoor activities (e.g., playing, gardening, etc.). (See the solid black box in Table 6-4*.)

- Exposure Pathway 3: Inhalation of Contaminated Soil as Airborne Dust--The reasons for the "N" code at Sites 6, 7, 29 (septic tanks 420, 417, 419, 486, 622, 655-1, and 655-2), 55, 80, and 82, and followup fieldwork Sites 11 and 50; and for the "S" code at Sites 3, 8, 33, 44 (Location I), 49, 58, 59, and 81 (Location II) are the same as those presented above for pathway 2. Future onsite residents may inhale contaminated dust from the remaining sites, which are marked with a solid black box in Table 6-4*.

- Exposure Pathway 4: Inhalation of Vapors Volatilized From Soil--For future residents, pathway 4 is not likely to be complete. An "N" is shown for Sites 6, 7, 29 (septic tanks 420, 417, 419, 486, 622, 655-1, and 655-2), 55, 80, and 82, and followup fieldwork Sites 11 and 50, at which no surface soil samples were collected--because surface soil contamination is not considered to be likely. In addition, contamination of the surface soil with VOCs at Sites 1, 3, 4, 8, 9, 13, 14, 16, 25 (Locations I and II), 33, 35, 38, 39, 45, 46, 49, 57 (Locations I, II, and III), 59, 60, 67, and 81 (Locations I and II), and followup fieldwork Sites 2, 5, 17, 19, and 26, is not considered to be probable; therefore, VOCs are not included as analytes at these sites, and pathway 4 is not likely to be complete (i.e., marked with an "N"). At Sites 10, 21, 27, 31, 32, 34, 41, 44 (Location I), 52, 53, 56, and 58, and followup fieldwork Sites 12, 15, 22, 30, 36, 44 (Location II), 47, and 48, no VOCs are identified as contaminants of concern in surface soil samples; therefore, an "S" is shown for pathway 4 at these sites for future onsite residents. Because future onsite residents may inhale vapors from surface soil at Site 37 and followup

fieldwork Site 18--the only remaining sites--they are marked with solid black boxes in Table 6-4*.

The followup fieldwork results do not change the conclusions of the Baseline RA exposure pathway evaluations for pathways 5, 6, 7, 8, or 9 under future residential land use conditions; therefore, these pathways discussions are not included in this addendum, but are summarized in Table 6-4*.

- Exposure Pathway 10: Consumption of Game That Feed on Vegetation Growing in Contaminated Soil--The reasons for the "N" code at Sites 6, 7, 29 (septic tanks 420, 417, 419, 486, 622, 655-1, and 655-2), 55, 80, and 82, and followup fieldwork Sites 11 and 50; and for the "S" code at Sites 3, 33, 44 (Location I), 49, 58, 59, and 81 (Location II) are the same as those presented above for pathway 1. An "S" is presented for Site 8, because no contaminants of concern are identified in 0- to 2-foot soil at this site. The code "T" is shown for all sites for this pathway, because--if the sites are developed for residential use--game (a transport mechanism for this pathway) are not expected to be present. In addition, it is unlikely that an onsite residential area would be used for recreational hunting. Therefore, this pathway is not considered to be complete for future residents at any of the study sites.

- Exposure Pathway 11: Consumption of Livestock (or Their Milk) That Feed on Vegetation Growing in Contaminated Soil or Consume Contaminated Groundwater--In the future, UMDA sites may be used to raise livestock for beef or for dairy uses. These livestock may graze on vegetation grown in contaminated soil or be watered with contaminated groundwater originating onsite. Receptors ingesting meat or milk from these livestock may be exposed to site-related contaminants. For Sites 6, 7, 29 (septic tanks 420, 417, 419, 486, 622, 655-1, and 655-2), 80, and 82, an "N" is shown for pathway 11, because neither surface soil nor groundwater contamination is considered likely to be of concern;

therefore, this pathway is not likely to be complete at these sites. For Sites 3, 33, 44 (Location I), 49, 58, and 81 (Location II), the "N" code indicates that no groundwater samples were collected, because groundwater contamination is not considered to be of concern; and the "S" code indicates that no surface soil contaminants of concern are identified. The "S" code at Site 59 indicates that neither soil nor groundwater contaminants of concern are identified. Pathway 11 is considered to be complete at the remaining sites if future residents raise livestock. As discussed in Section 6.1.2.1 of the Baseline RA, future residents in this case also include farm families who may ingest the livestock; however, this pathway may not apply to nonfarming residential families.

- Exposure Pathway 12: Consumption of Crops Irrigated by Contaminated Groundwater or Grown in Contaminated Soil--In the future, residents living on UMDA sites may plant gardens and grow vegetables for home consumption. At each of the UMDA sites, gardens may be planted in contaminated soil or be irrigated with contaminated groundwater originating onsite. Receptors who ingest garden vegetables may be exposed to site-related contaminants. The reasons for the "N" and "S" codes for this pathway are the same as those discussed above for pathway 11. Pathway 12 is considered to be complete for future residents at the remaining sites. As discussed in Section 6.1.2.1, future residents in this case also include farm families who may grow and consume crops; however, this pathway may not necessarily apply to nonfarming residential families.

6.2.2.2* Future Industrial and Military Land Use. Table 6-5* identifies exposure pathways that are considered to be complete under the future industrial and military land use scenario. Also summarized are the reasons why other pathways are incomplete at UMDA.

TABLE 6-5*
Summary of Operable Exposure Pathways at UMDA
Future Industrial and Military Land Use Scenario

Site No.	EXPOSURE PATHWAY NUMBERS (SEE TABLE 6-1)											
	1	2	3	4	5	6	7	8	9	10	11	12
1	S			N	N	N,T	N,T	N	N	T	T	T
**2	S			N	N	N,T	N,T	N	N	T	T	T
3	S	S	S	N	N	N,T	N,T	N	N	S,T	N,S,T	N,S,T
4 flood gravel (a)				N		T	T			T	T	T
4 basalt (a)				N		S,T	T		S	T	T	T
**5				N	N	N,T	N,T	N	N	T	T	T
6	N	N	N	N	N	N,T	N,T	N	N	N,T	N,T	N,T
7	N	N	N	N	N	N,T	N,T	N	N	N,T	N,T	N,T
8 (a)	N	S	S	N		T	T			S,T	T	T
9				N	N	N,T	N,T	N	N	T	T	T
10	S			S	N	N,T	N,T	N	N	T	T	T
**11	N	N	N	N		S,T	T		S	N,T	T	T
**12				S		S,T	T		S	T	T	T
13 (a)				N		S,T	S,T	S	S	T	T	T
14 (a)	S			N		S,T	S,T	S	S	T	T	T
**15 (a)				S		S,T	S,T	S	S	T	T	T
16				N		S,T	S,T	S	S	T	T	T
**17				N	N	N,T	N,T	N	N	T	T	T
**18						S,T	S,T	S	S	T	T	T
**19				N		S,T	T		S	T	T	T
21	S			S	N	N,T	N,T	N	N	T	T	T
**22				S	N	N,T	N,T	N	N	T	T	T
25 I	S			N	N	N,T	N,T	N	N	T	T	T
25 II	S			N	N	N,T	N,T	N	N	T	T	T
**26	N			N	N	N,T	N,T	N	N	T	T	T

TABLE 6-5* (cont'd)
Summary of Operable Exposure Pathways at UMDA
Future Industrial and Military Land Use Scenario

	EXPOSURE PATHWAY NUMBERS (SEE TABLE 6-1)											
Site No.	1	2	3	4	5	6	7	8	9	10	11	12
27				S	N	N,T	N,T	N	N	T	T	T
29 #420	N	N	N	N	N	N,T	N,T	N	N	N,T	N,T	N,T
29 #417	N	N	N	N	N	N,T	N,T	N	N	N,T	N,T	N,T
29 419	N	N	N	N	N	N,T	N,T	N	N	N,T	N,T	N,T
29 #486	N	N	N	N	N	N,T	N,T	N	N	N,T	N,T	N,T
29 #655-1	N	N	N	N	N	N,T	N,T	N	N	N,T	N,T	N,T
29 #655-2	N	N	N	N	N	N,T	N,T	N	N	N,T	N,T	N,T
29 #622	N	N	N	N	N	N,T	N,T	N	N	N,T	N,T	N,T
**30				S	N	N,T	N,T	N	N	T	T	T
31 (a)				S		T	T			T	T	T
32 I				S	N	N,T	N,T	N	N	T	T	T
32 II				S	N	N,T	N,T	N	N	T	T	T
33	S	S	S	N	N	N,T	N,T	N	N	S,T	N,S,T	N,S,T
34				S	N	N,T	N,T	N	N	T	T	T
35				N	N	N,T	N,T	N	N	T	T	T
**36	S			S	N	N,T	N,T	N	N	T	T	T
37					N	N,T	N,T	N	N	T	T	T
38 (a)				N		S,T	S,T	S	S	T	T	T
39	S			N	N	N,T	N,T	N	N	T	T	T
41				S		S,T	S,T	S	S	T	T	T
44 I	S	S	S	S	N	N,T	N,T	N	N	S,T	N,S,T	N,S,T
**44 II	S			S	N	N,T	N,T	N	N	T	T	T
45 (612)	S			N	N	N,T	N,T	N	N	T	T	T
45 (617)	S			N	N	N,T	N,T	N	N	T	T	T
46				N	N	N,T	N,T	N	N	T	T	T

TABLE 6-5* (cont'd)
Summary of Operable Exposure Pathways at UMDA
Future Industrial and Military Land Use Scenario

EXPOSURE PATHWAY NUMBERS (SEE TABLE 6-1)

Site No.	1	2	3	4	5	6	7	8	9	10	11	12
**47 (a)	■	■	■	S	■	T	T	■	■	T	T	T
**48	■	■	■	S	N	N,T	N,T	N	N	T	T	T
49	S	S	S	N	N	N,T	N,T	N	N	S,T	N,S,T	N,S,T
**50 (a)	N	N	N	N	■	S,T	T	■	S	N,T	T	T
52	■	■	■	S	N	N,T	N,T	N	N	T	T	T
53	■	■	■	S	N	N,T	N,T	N	N	T	T	T
55 (a)	N	N	N	N	■	S,T	S,T	S	S	N,T	T	T
56	S	■	■	S	N	N,T	N,T	N	N	T	T	T
57 I	S	■	■	N	■	S,T	S,T	S	S	T	T	T
57 II (a)	■	■	■	N	■	S,T	S,T	S	S	T	T	T
57 III	S	■	■	N	■	S,T	S,T	S	S	T	T	T
58	S	S	S	S	N	N,T	N,T	N	N	S,T	N,S,T	N,S,T
59	S	S	S	N	S	N,T	S,T	S	N	S,T	S,T	S,T
60	S	■	■	N	N	N,T	N,T	N	N	T	T	T
67 (a)	S	■	■	N	■	T	T	■	■	T	T	T
80	N	N	N	N	N	N,T	N,T	N	N	N,T	N,T	N,T
81 I	S	■	■	N	N	N,T	N,T	N	N	T	T	T
81 II	S	S	S	N	N	N,T	N,T	N	N	S,T	N,S,T	N,S,T
82	N	N	N	N	N	N,T	N,T	N	N	N,T	N,T	N,T

NOTES:

■ - Indicates that exposure pathway is complete at site.

N - Sampling was not performed since the medium and/or chemical were not considered to be of concern. Therefore, no data are available, but the pathway at the site is not likely to be complete.
S - Contaminant source applicable to the specific pathway has been shown to not exist based on sampling results or based on selection of chemicals of concern (See Section 3.0).
T - Transport medium necessary for pathway (e.g., well, for groundwater ingestion) does not exist at the site.

(a) - Groundwater data were grouped as follows for certain sites since contamination in these wells may originate from any site within the group:
Sites 4, 47, 67 (flood gravel and basalt aquifers)
Sites 8, 31
Sites 13, 57 II
Sites 14, 38
Sites 15, 55
* - Replaces original Table 6-5 in the Final Baseline RA; Dames & Moore, 1992a.
** - Site at which followup fieldwork was conducted.

- Exposure Pathway 1: Dermal Contact With Contaminated Soil and Subsequent Dermal Absorption--The reasons for the "N" code at Sites 6, 7, 8, 29 (septic tanks 420, 417, 419, 486, 622, 655-1, and 655-2), 55, 80, and 82, and followup fieldwork Sites 11, 26, and 50; and for the "S" code at Sites 1, 3, 10, 14, 21, 25 (Locations I and II), 33, 39, 44 (Location I), 45 (Locations I and II), 49, 56, 57 (Locations I and III), 58, 59, 60, 67, and 81 (Locations I and II), and followup fieldwork Sites 2, 18, 36, and 44 (Location II), are the same as those discussed for this pathway in Section 6.2.2.1*. Industrial or military personnel involved in activities conducted outdoors at the remaining sites (marked with a solid black box in Table 6-5*) may contact contaminated surface soil and dermally absorb organic soil contaminants. Exceptions are future Oregon National Guard personnel who may use sites in Operable Unit B for tank training exercises. These trainees are expected to remain inside their vehicles and not come in contact with contaminated soil at Sites 13, 14, 16, 31, 32, 38, 41, and 57 (Location II), or followup fieldwork Sites 15, 17, and 19.

- Exposure Pathway 2: Inadvertent Ingestion of Contaminated Soil--The reasons for the "N" code at Sites 6, 7, 29 (septic tanks 420, 417, 419, 486, 622, 655-1, and 655-2), 55, 80, and 82, and followup fieldwork Sites 11 and 50; and for the "S" code at Sites 3, 8, 33, 44 (Location I), 49, 58, 59, and 81 (Location II) are the same as those discussed for pathway 2 in Section 6.2.2.1*. Industrial or military personnel involved in activities conducted outdoors at the remaining sites (marked with a solid black box in Table 6-5*) may contact and incidentally ingest contaminated surface soil. Exceptions are future Oregon National Guard personnel who may use sites in Operable Unit B for tank training exercises. These trainees are expected to remain inside their vehicles and not come in contact with contaminated soil at Sites 13, 14, 16, 31, 32, 38, 41, and 57 (Location II), or followup fieldwork Sites 15, 17, and 19.

- Exposure Pathway 3: Inhalation of Contaminated Soil as Airborne Dust--The reasons for the "N" code at Sites 6, 7, 29 (septic tanks 420, 417, 419, 486, 622, 655-1, and 655-2), 55, 80, and 82, and followup fieldwork Sites 11 and 50; and for the "S" code at Sites 3, 8, 33, 44 (Location I), 49, 58, 59, and 81 (Location II) are the same as those discussed for pathway 2 in Section 6.2.2.1*. Industrial or military personnel, including personnel involved in tank training exercises in Operable Unit B, may inhale contaminated airborne dust from the remaining sites (which are marked with a solid black box in Table 6-5*).

- Exposure Pathway 4: Inhalation of Vapors Volatilized From Soil--The reasons for the "N" code at Sites 1, 3, 4, 6, 7, 8, 9, 13, 14, 16, 25 (Locations I and II), 29 (septic tanks 420, 417, 419, 486, 622, 655-1, and 655-2), 33, 35, 38, 39, 45 (Locations I and II), 46, 49, 55, 57 (Locations I, II, and III), 59, 60, 67, 80, 81 (Locations I and II), and 82, and followup fieldwork Sites 2, 5, 11, 17, 19, 26, and 50; and for the "S" code at Sites 10, 21, 27, 31, 32, 34, 41, 44 (Location I), 52, 53, 56, and 58, and followup fieldwork Sites 12, 15, 22, 30, 36, 47, and 48, are the same as those discussed for pathway 4 in Section 6.2.2.1*. Pathway 4 is considered to be complete for future industrial and military personnel who may inhale VOCs from site soil while working at Site 37 and followup fieldwork Site 18--the only remaining sites (which are marked with solid black boxes in Table 6-5*).

The followup fieldwork results do not change the conclusions of the Baseline RA exposure pathway evaluations for pathways 5, 6, 7, 8, or 9 under future industrial and military land use conditions; therefore, these pathway discussions are not included in this addendum, but are summarized in Table 6-5*.

- Exposure Pathway 10: Consumption of Game That Feed on Vegetation Growing in Contaminated Soil--The reasons for the "N" code at Sites 6, 7, 29 (septic tanks 420, 417, 419, 486, 622, 655-1, and 655-2), 55, 80, and

82, and followup fieldwork Sites 11 and 50; and for the "S" code at Sites 3, 33, 44 (Location I), 49, 58, 59, and 81 (Location II) are the same as those discussed for pathway 10 in Section 6.2.2.1*. An "S" is presented for Site 8, because no contaminants of concern are identified in 0- to 2-foot soil at this site. The code "T" is shown at all sites for this pathway, because it is unlikely that the sites will be used for recreational hunting if they are developed for industrial or military use. Therefore, this pathway is not considered to be complete for future industrial or military personnel at any of the study sites.

- Exposure Pathway 11: Consumption of Livestock (or Their Milk) That Feed on Vegetation Growing in Contaminated Soil or Consume Contaminated Groundwater--For Sites 6, 7, 29 (septic tanks 420, 417, 419, 486, 622, 655-1, and 655-2), 80, and 82, an "N" is shown for this pathway, because neither surface soil nor groundwater contamination is considered to be of concern. For Sites 3, 33, 44 (Location I), 49, 58, and 81 (Location II), the "N" code indicates that no groundwater samples were collected (because groundwater contamination is not considered to be of concern at these sites), and the "S" code indicates that no surface soil contaminants of concern are identified. The "S" code at Site 59 indicates that neither soil nor groundwater contaminants of concern are identified. If the UMDA sites are developed for industrial or military use, it is unlikely that they will also be used to raise livestock (a transport mechanism for this pathway). Therefore, a "T" is shown in Table 6-5* for each site.

- Exposure Pathway 12: Consumption of Crops Irrigated by Contaminated Groundwater or Grown in Contaminated Soil--The reasons for the "N" and "S" codes shown for this pathway are the same as those presented above for pathway 11. UMDA sites developed for industrial or military use are unlikely to be used to raise crops (a transport mechanism for

this pathway). Therefore, a "T" is shown in Table 6-5* for each site under these land uses.

6.2.2.3* Future Agricultural (Farming) Land Use. Table 6-6* identifies exposure pathways that are considered to be complete under the future agricultural land use scenario. Also summarized are the reasons why other pathways are incomplete at UMDA.

- Exposure Pathway 1: Dermal Contact With Contaminated Soil and Subsequent Dermal Absorption--The reasons for the "N" code at Sites 6, 7, 8, 29 (septic tanks 420, 417, 419, 486, 622, 655-1, and 655-2), 55, 80, and 82, and followup fieldwork Sites 11, 26, and 50; and for the "S" code at Sites 1, 3, 10, 14, 21, 25 (Locations I and II), 33, 39, 44 (Location I), 45 (Locations I and II), 49, 56, 57 (Locations I and III), 58, 59, 60, 67, and 81 (Locations I and II), and followup fieldwork Sites 2, 18, 36, and 44 (Location II), are the same as those discussed for this pathway in Section 6.2.2.1*. Farmers involved in agricultural activities at the remaining sites (marked with a solid black box in Table 6-6*) may contact contaminated surface soil and dermally absorb organic soil contaminants.

- Exposure Pathway 2: Inadvertent Ingestion of Contaminated Soil--The reasons for the "N" code at Sites 6, 7, 29 (septic tanks 420, 417, 419, 486, 622, 655-1, and 655-2), 55, 80, and 82, and followup fieldwork Sites 11 and 50; and for the "S" code at Sites 3, 8, 33, 44 (Location I), 49, 58, 59, and 81 (Location II) are the same as those discussed for pathway 2 in Section 6.2.2.1*. Farmers involved in agricultural activities at the remaining sites (marked with a solid black box in Table 6-6*) may contact and incidentally ingest contaminated surface soil.

- Exposure Pathway 3: Inhalation of Contaminated Soil as Airborne Dust--The reasons for the "N" code at Sites 6, 7, 29 (septic tanks 420, 417, 419, 486, 622, 655-1, and 655-2), 55, 80, and 82, and followup

TABLE 6-6*
Summary of Operable Exposure Pathways at UMDA
Future Agricultural (Farmer) Land Use Scenario

EXPOSURE PATHWAY NUMBERS (SEE TABLE 6-1)

Site No.	1	2	3	4	5	6	7	8	9	10	11	12
1	S			N	N,T	N,T	N,T	N	N	T	T	T
**2	S			N	N,T	N,T	N,T	N	N	T	T	T
3	S	S	S	N	N,T	N,T	N,T	N	N	S,T	N,S,T	N,S,T
4 flood gravel (a)				N	T	T	T			T	T	T
4 basalt (a)				N	T	S,T	T		S	T	T	T
**5				N	N,T	N,T	N,T	N	N	T	T	T
6	N	N	N	N	N,T	N,T	N,T	N	N	N,T	N,T	N,T
7	N	N	N	N	N,T	N,T	N,T	N	N	N,T	N,T	N,T
8 (a)	N	S	S	N	T	T	T			S,T	T	T
9				N	N,T	N,T	N,T	N	N	T	T	T
10	S			S	N,T	N,T	N,T	N	N	T	T	T
**11	N	N	N	N	T	S,T	T		S	N,T	T	T
**12				S	T	S,T	T		S	T	T	T
13 (a)				N	T	S,T	S,T	S	S	T	T	T
14 (a)	S			N	T	S,T	S,T	S	S	T	T	T
**15 (a)				S	T	S,T	S,T	S	S	T	T	T
16				N	T	S,T	S,T	S	S	T	T	T
**17				N	N,T	N,T	N,T	N	N	T	T	T
**18					T	S,T	S,T	S	S	T	T	T
**19				N	T	S,T	T		S	T	T	T
21	S			S	N,T	N,T	N,T	N	N	T	T	T
**22				S	N,T	N,T	N,T	N	N	T	T	T
25 I	S			N	N,T	N,T	N,T	N	N	T	T	T
25 II	S			N	N,T	N,T	N,T	N	N	T	T	T
**26	N			N	N,T	N,T	N,T	N	N	T	T	T

TABLE 6-6* (cont'd)
Summary of Operable Exposure Pathways at UMDA
Future Agricultural (Farmer) Land Use Scenario

Site No.	EXPOSURE PATHWAY NUMBERS (SEE TABLE 6-1)											
	1	2	3	4	5	6	7	8	9	10	11	12
27				S	N,T	N,T	N,T	N	N	T	T	T
29 #420	N	N	N	N	N,T	N,T	N,T	N	N	N,T	N,T	N,T
29 #417	N	N	N	N	N,T	N,T	N,T	N	N	N,T	N,T	N,T
29 419	N	N	N	N	N,T	N,T	N,T	N	N	N,T	N,T	N,T
29 #486	N	N	N	N	N,T	N,T	N,T	N	N	N,T	N,T	N,T
29 #655-1	N	N	N	N	N,T	N,T	N,T	N	N	N,T	N,T	N,T
29 #655-2	N	N	N	N	N,T	N,T	N,T	N	N	N,T	N,T	N,T
29 #622	N	N	N	N	N,T	N,T	N,T	N	N	N,T	N,T	N,T
**30				S	N,T	N,T	N,T	N	N	T	T	T
31 (a)				S	T	T	T			T	T	T
32 I				S	N,T	N,T	N,T	N	N	T	T	T
32 II				S	N,T	N,T	N,T	N	N	T	T	T
33	S	S	S	N	N,T	N,T	N,T	N	N	S,T	N,S,T	N,S,T
34				S	N,T	N,T	N,T	N	N	T	T	T
35				N	N,T	N,T	N,T	N	N	T	T	T
**36	S			S	N,T	N,T	N,T	N	N	T	T	T
37					N,T	N,T	N,T	N	N	T	T	T
38 (a)				N	T	S,T	S,T	S	S	T	T	T
39	S			N	N,T	N,T	N,T	N	N	T	T	T
41				S	T	S,T	S,T	S	S	T	T	T
44 I	S	S	S	S	N,T	N,T	N,T	N	N	S,T	N,S,T	N,S,T
**44 II	S			S	N,T	N,T	N,T	N	N	T	T	T
45 (612)	S			N	N,T	N,T	N,T	N	N	T	T	T
45 (617)	S			N	N,T	N,T	N,T	N	N	T	T	T
46				N	N,T	N,T	N,T	N	N	T	T	T

TABLE 6-6* (cont'd)
Summary of Operable Exposure Pathways at UMDA
Future Agricultural (Farmer) Land Use Scenario

EXPOSURE PATHWAY NUMBERS (SEE TABLE 6-1)

Site No.	1	2	3	4	5	6	7	8	9	10	11	12
**47 (a)	■	■	■	S	T	T	T	■	■	T	T	T
**48	■	■	■	S	N,T	N,T	N,T	N	N	T	T	T
49	S	S	S	N	N,T	N,T	N,T	N	N	S,T	N,S,T	N,S,T
**50 (a)	N	N	N	N	T	S,T	T	■	S	N,T	T	T
52	■	■	■	S	N,T	N,T	N,T	N	N	T	T	T
53	■	■	■	S	N,T	N,T	N,T	N	N	T	T	T
55 (a)	N	N	N	N	T	S,T	S,T	S	S	N,T	T	T
56	S	■	■	S	N,T	N,T	N,T	N	N	T	T	T
57 I	S	■	■	N	T	S,T	S,T	S	S	T	T	T
57 II (a)	■	■	■	N	T	S,T	S,T	S	S	T	T	T
57 III	S	■	■	N	T	S,T	S,T	S	S	T	T	T
58	S	S	S	S	N,T	N,T	N,T	N	N	S,T	N,S,T	N,S,T
59	S	S	S	N	S,T	N,T	S,T	S	N	S,T	S,T	S,T
60	S	■	■	N	N,T	N,T	N,T	N	N	T	T	T
67 (a)	S	■	■	N	T	T	T	■	■	T	T	T
80	N	N	N	N	N,T	N,T	N,T	N	N	N,T	N,T	N,T
81 I	S	■	■	N	N,T	N,T	N,T	N	N	T	T	T
81 II	S	S	S	N	N,T	N,T	N,T	N	N	S,T	N,S,T	N,S,T
82	N	N	N	N	N,T	N,T	N,T	N	N	N,T	N,T	N,T

NOTES:

■ - Indicates that exposure pathway is complete at site.

N - Sampling was not performed since the medium and/or chemical were not considered to be of concern. Therefore, no data are available, but the pathway at the site is not likely to be complete.

S - Contaminant source applicable to the specific pathway has been shown to not exist based on sampling results or based on selection of chemicals of concern (See Section 3.0).

T - Transport medium necessary for pathway (e.g., well, for groundwater ingestion) does not exist at the site.

(a) - Groundwater data were grouped as follows for certain sites since contamination in these wells may originate from any site within the group:
Sites 4, 47, 67 (flood gravel and basalt aquifers)
Sites 8, 31
Sites 13, 57 II
Sites 14, 38
Sites 15, 55

* - Replaces original Table 6-6 in the Final Baseline RA; Dames & Moore, 1992a.

** - Site at which followup fieldwork was conducted.

fieldwork Sites 11 and 50; and for the "S" code at Sites 3, 8, 33, 44 (Location I), 49, 58, 59, and 81 (Location II) are the same as those presented for pathway 2 in Section 6.2.2.1*. Farmers may inhale contaminated airborne dust from the remaining sites (marked with a solid black box in Table 6-6*) while performing agricultural work (e.g., plowing fields).

- Exposure Pathway 4: Inhalation of Vapors Volatilized From Soil--The reasons for the "N" code at Sites 1, 3, 4, 6, 7, 8, 9, 13, 14, 16, 25 (Locations I and II), 29 (septic tanks 420, 417, 419, 486, 622, 655-1, and 655-2), 33, 35, 38, 39, 45 (Locations I and II), 46, 49, 55, 57 (Locations I, II, and III), 59, 60, 67, 80, 81 (Locations I and II), and 82, and followup fieldwork Sites 2, 5, 11, 17, 19, 26, and 50; and for the "S" code at Sites 10, 21, 27, 31, 32, 34, 41, 44 (Location I), 52, 53, 56, and 58, and followup fieldwork Sites 12, 15, 22, 30, 36, 47, and 48, are the same as those discussed for pathway 4 in Section 6.2.2.1*. Pathway 4 is considered to be complete for future farmers who may inhale VOCs from site soil while working at Site 37 (which is marked with a solid black box in Table 6-6*).

The followup fieldwork results do not change the conclusions of the Baseline RA exposure pathway evaluations for pathways 5, 6, 7, 8, and 9 under future agricultural land use conditions; therefore, these pathway discussions are not included in this addendum, but are summarized in Table 6-6*.

- Exposure Pathway 10: Consumption of Game That Feed on Vegetation Growing in Contaminated Soil--The reasons for the "N" code at Sites 6, 7, 29 (septic tanks 420, 417, 419, 486, 622, 655-1, and 655-2), 55, 80, and 82, and followup fieldwork Sites 11 and 50; and for the "S" code at Sites 3, 33, 44 (Location I), 49, 58, 59, and 81 (Location II) are the same as those presented for pathway 1 in Section 6.2.2.1*. Site 8 is marked with an "S," because no contaminants of concern are identified in soil at

this site. The code "T" is shown for all sites for this pathway, because--if the sites are developed for agricultural use--it is unlikely that they will also be used for recreational hunting. Therefore, pathway 10 is not considered to be complete for future farmers at any of the study sites.

- <u>Exposure Pathway 11: Consumption of Livestock (or Their Milk) That Feed on Vegetation Growing in Contaminated Soil or Consume Contaminated Groundwater</u>--For Sites 6, 7, 29 (septic tanks 420, 417, 419, 486, 622, 655-1, and 655-2), 80, and 82, an "N" is shown, for this pathway, because neither surface soil nor groundwater contamination is considered to be of concern. Pathway 11 is not likely to be complete at these sites. For Sites 3, 33, 44 (Location I), 49, 58, and 81 (Location II), the "N" code indicates that no groundwater samples were collected, because groundwater contamination is not considered to be of concern, and the "S" code indicates that no surface soil contaminants of concern are identified. The "S" code at Site 59 indicates that neither soil nor groundwater contaminants of concern are identified. As discussed in Section 6.1.2.1 of the Baseline RA, future agricultural land use refers only to farming activities, not to farm families residing onsite and eating livestock grown onsite. Farm families are included in the RA as residents, and pathways for future residents (Section 6.2.2.1*) apply to them. A "T" is shown in Table 6-6* for each site, and pathway 11 is not complete for any site under future agricultural land use conditions.

- <u>Exposure Pathway 12: Consumption of Crops Irrigated by Contaminated Groundwater or Grown in Contaminated Soil</u>--The reasons for the "N" and "S" codes shown for this pathway are the same as those discussed above for pathway 11. As discussed in Section 6.1.2.1 of the Baseline RA, future agricultural land use refers only to farming activities, not to farm families residing onsite and eating crops grown onsite. Farm families are considered to be residents, and pathways for future residents (Section 6.2.2.1*) apply to them. Therefore, a "T" is shown in Table 6-6*

for each site, and this pathway is not complete for any site under future agricultural land use conditions.

6.2.2.4* Future Recreational (Hunting) Land Use. Table 6-7* identifies exposure pathways that are considered to be complete under the future hunting land use scenario. Also summarized are the reasons why other pathways are incomplete.

- Exposure Pathway 1: Dermal Contact With Contaminated Soil and Subsequent Dermal Absorption--The reasons for the "N" code at Sites 6, 7, 8, 29 (septic tanks 420, 417, 419, 486, 622, 655-1, and 655-2), 55, 80, and 82, and followup fieldwork Sites 11, 26, and 50; and for the "S" code at Sites 1, 3, 10, 14, 21, 25 (Locations I and II), 33, 39, 44 (Location I), 45 (Locations I and II), 49, 56, 57 (Locations I and III), 58, 59, 60, 67, and 81 (Locations I and II), and followup fieldwork Sites 2, 18, 26, 36, and 44 (Location II), are the same as those discussed for this pathway in Section 6.2.2.1*. Hunters tracking game on the remaining sites (marked with a solid black box in Table 6-7*) may contact contaminated surface soil and dermally absorb organic soil contaminants.

- Exposure Pathway 2: Inadvertent Ingestion of Contaminated Soil--The reasons for the "N" code at Sites 6, 7, 29 (septic tanks 420, 417, 419, 486, 622, 655-1, and 655-2), 55, 80, and 82, and followup fieldwork Sites 11 and 50; and for the "S" code at Sites 3, 8, 33, 44 (Location I), 49, 58, 59, and 81 (Location II) are the same as those discussed for pathway 2 in Section 6.2.2.1*. Hunters tracking game on the remaining sites (marked with a solid black box in Table 6-7*) may contact and incidentally ingest contaminated surface soil.

- Exposure Pathway 3: Inhalation of Contaminated Soil as Airborne Dust--The reasons for the "N" code at Sites 6, 7, 29 (septic tanks 420, 417, 419, 486, 622, 655-1, and 655-2), 55, 80, and 82, and followup fieldwork Sites 11 and 50; and for the "S" code at Sites 3, 8, 33, 44 (Location I), 49, 58, 59, and 81 (Location II) are the same as those

TABLE 6-7*
Summary of Operable Exposure Pathways at UMDA
Future Recreational (Hunter) Land Use Scenario

Site No.	EXPOSURE PATHWAY NUMBERS (SEE TABLE 6-1)											
	1	2	3	4	5	6	7	8	9	10	11	12
1	S			N	N,T	N,T	N,T	N,T	N,T		T	T
**2	S			N	N,T	N,T	N,T	N,T	N,T		T	T
3	S	S	S	N	N,T	N,T	N,T	N,T	N,T	S	N,S,T	N,S,T
4 flood gravel (a)				N	T	T	T	T	T		T	T
4 basalt (a)				N	T	S,T	T	T	S,T		T	T
**5				N	N,T	N,T	N,T	N,T	N,T		T	T
6	N	N	N	N	N,T	N,T	N,T	N,T	N,T	N	N,T	N,T
7	N	N	N	N	N,T	N,T	N,T	N,T	N,T	N	N,T	N,T
8 (a)	N	S	S	N	T	T	T	T	T	S	T	T
9				N	N,T	N,T	N,T	N,T	N,T		T	T
10	S			S	N,T	N,T	N,T	N,T	N,T		T	T
**11	N	N	N	N	T	S,T	T	T	S,T	N	T	T
**12				S	T	S,T	T	T	S,T		T	T
13 (a)				N	T	S,T	S,T	S,T	S,T		T	T
14 (a)	S			N	T	S,T	S,T	S,T	S,T		T	T
**15 (a)				S	T	S,T	S,T	S,T	S,T		T	T
16				N	T	S,T	S,T	S,T	S,T		T	T
**17				N	N,T	N,T	N,T	N,T	N,T		T	T
**18					T	S,T	S,T	T	S,T		T	T
**19				N	T	S,T	T	T	S,T		T	T
21	S			S	N,T	N,T	N,T	N,T	N,T		T	T
**22				S	N,T	N,T	N,T	N,T	N,T		T	T
25 I	S			N	N,T	N,T	N,T	N,T	N,T		T	T
25 II	S			N	N,T	N,T	N,T	N,T	N,T		T	T
**26	N			N	N,T	N,T	N,T	N,T	N,T		T	T

TABLE 6-7* (cont'd)
Summary of Operable Exposure Pathways at UMDA
Future Recreational (Hunter) Land Use Scenario

EXPOSURE PATHWAY NUMBERS (SEE TABLE 6-1)

Site No.	1	2	3	4	5	6	7	8	9	10	11	12
27				S	N,T	N,T	N,T	N,T	N,T		T	T
29 #420	N	N	N	N	N,T	N,T	N,T	N,T	N,T	N	N,T	N,T
29 #417	N	N	N	N	N,T	N,T	N,T	N,T	N,T	N	N,T	N,T
29 419	N	N	N	N	N,T	N,T	N,T	N,T	N,T	N	N,T	N,T
29 #486	N	N	N	N	N,T	N,T	N,T	N,T	N,T	N	N,T	N,T
29 #655-1	N	N	N	N	N,T	N,T	N,T	N,T	N,T	N	N,T	N,T
29 #655-2	N	N	N	N	N,T	N,T	N,T	N,T	N,T	N	N,T	N,T
29 #622	N	N	N	N	N,T	N,T	N,T	N,T	N,T	N	N,T	N,T
**30				S	N,T	N,T	N,T	N,T	N,T		T	T
31 (a)				S	T	T	T	T	T		T	T
32 I				S	N,T	N,T	N,T	N,T	N,T		T	T
32 II				S	N,T	N,T	N,T	N,T	N,T		T	T
33	S	S	S	N	N,T	N,T	N,T	N,T	N,T	S	N,S,T	N,S,T
34				S	N,T	N,T	N,T	N,T	N,T		T	T
35				N	N,T	N,T	N,T	N,T	N,T		T	T
**36	S			S	N,T	N,T	N,T	N,T	N,T		T	T
37					N,T	N,T	N,T	N,T	N,T		T	T
38 (a)				N	T	S,T	S,T	S,T	S,T		T	T
39	S			N	N,T	N,T	N,T	N,T	N,T		T	T
41				S	T	S,T	S,T	S,T	S,T		T	T
44 I	S	S	S	S	N,T	N,T	N,T	N,T	N,T	S	N,S,T	N,S,T
**44 II	S			S	N,T	N,T	N,T	N,T	N,T		T	T
45 (612)	S			N	N,T	N,T	N,T	N,T	N,T		T	T
45 (617)	S			N	N,T	N,T	N,T	N,T	N,T		T	T
46				N	N,T	N,T	N,T	N,T	N,T		T	T

TABLE 6-7* (cont'd)
Summary of Operable Exposure Pathways at UMDA
Future Recreational (Hunter) Land Use Scenario

EXPOSURE PATHWAY NUMBERS (SEE TABLE 6-1)

Site No.	1	2	3	4	5	6	7	8	9	10	11	12
**47 (a)	■	■	■	S	T	T	T	T	T	■	T	T
**48	■	■	■	S	N,T	N,T	N,T	N,T	N,T	■	T	T
49	S	S	S	N	N,T	N,T	N,T	N,T	N,T	S	N,S,T	N,S,T
**50 (a)	N	N	N	N	T	S,T	T	T	S,T	N	T	T
52	■	■	■	S	N,T	N,T	N,T	N,T	N,T	■	T	T
53	■	■	■	S	N,T	N,T	N,T	N,T	N,T	■	T	T
55 (a)	N	N	N	N	T	S,T	S,T	S,T	S,T	N	T	T
56	S	■	■	S	N,T	N,T	N,T	N,T	N,T	■	T	T
57 I	S	■	■	N	T	S,T	S,T	S,T	S,T	■	T	T
57 II (a)	■	■	■	N	T	S,T	S,T	S,T	S,T	■	T	T
57 III	S	■	■	N	T	S,T	S,T	S,T	S,T	■	T	T
58	S	S	S	S	N,T	N,T	N,T	N,T	N,T	S	N,S,T	N,S,T
59	S	S	S	N	S,T	N,T	S,T	S,T	N,T	S	S,T	S,T
60	S	■	■	N	N,T	N,T	N,T	N,T	N,T	■	T	T
67 (a)	S	■	■	N	T	T	T	T	T	■	T	T
80	N	N	N	N	N,T	N,T	N,T	N,T	N,T	N	N,T	N,T
81 I	S	■	■	N	N,T	N,T	N,T	N,T	N,T	■	T	T
81 II	S	S	S	N	N,T	N,T	N,T	N,T	N,T	S	N,S,T	N,S,T
82	N	N	N	N	N,T	N,T	N,T	N,T	N,T	N	N,T	N,T

NOTES:

■ - Indicates that exposure pathway is complete at site.

N - Sampling was not performed since the medium and/or chemical were not considered to be of concern. Therefore, no data are available, but the pathway at the site is not likely to be complete.

S - Contaminant source applicable to the specific pathway has been shown to not exist based on sampling results or based on selection of chemicals of concern (See Section 3.0).

T - Transport medium necessary for pathway (e.g., well, for groundwater ingestion) does not exist at the site.

(a) - Groundwater data were grouped as follows for certain sites since contamination in these wells may originate from any site within the group:
Sites 4, 47, 67 (flood gravel and basalt aquifers)
Sites 8, 31
Sites 13, 57 II
Sites 14, 38
Sites 15, 55

* - Replaces original Table 6-7 in the Final Baseline RA; Dames & Moore, 1992a.

** - Site at which followup fieldwork was conducted.

discussed for pathway 2 in Section 6.2.2.1*. Hunters may inhale contaminated airborne dust from the remaining sites (marked with a solid black box in Table 6-7*) while walking on the grounds.

- Exposure Pathway 4: Inhalation of Vapors Volatilized From Soil--The reasons for the "N" code at Sites 1, 3, 4, 6, 7, 8, 9, 13, 14, 16, 25 (Locations I and II), 29 (septic tanks 420, 417, 419, 486, 622, 655-1, and 655-2), 33, 35, 38, 39, 45 (Locations I and II), 46, 49, 55, 57 (Locations I, II, and III), 59, 60, 67, 80, 81 (Locations I and II), and 82, and followup fieldwork Sites 2, 5, 11, 17, 19, 26, and 50; and for the "S" code at Sites 10, 21, 27, 31, 32, 34, 41, 44 (Location I), 52, 53, 56, and 58, and followup fieldwork Sites 12, 15, 22, 30, 36, 44 (Location II), 47, and 48, are the same as those discussed for pathway 4 in Section 6.2.2.1*. Pathway 4 is considered to be complete for future hunters who may inhale VOCs from site soil while working at Site 37 and followup fieldwork Site 18 (which are marked with solid black boxes in Table 6-7*).

The followup fieldwork results do not change the conclusions of the Baseline RA exposure pathway evaluations for pathways 5, 6, 7, 8, and 9 under future recreational land use conditions; therefore, these pathway discussions are not included in this addendum, but are summarized in Table 6-7*.

- Exposure Pathway 10: Consumption of Game That Feed on Vegetation Growing in Contaminated Soil--The reasons for the "N" code at Sites 6, 7, 29 (septic tanks 420, 417, 419, 486, 622, 655-1, and 655-2), 55, 80, and 82, and followup fieldwork Sites 11 and 50; and for the "S" code at Sites 3, 33, 44 (Location I), 49, 58, 59, and 81 (Location II) are the same as those presented for pathway 1 in Section 6.2.2.1*. An "S" is presented for Site 8, because no contaminants of concern are identified in soil. Hunters are the population expected to consume game hunted and killed onsite. Because these game may have ingested vegetation grown in

contaminated soil, this pathway is complete for hunters at the sites marked with a solid black box in Table 6-7*.

- Exposure Pathway 11: Consumption of Livestock (or Their Milk) That Feed on Vegetation Growing in Contaminated Soil or Consume Contaminated Groundwater--For Sites 6, 7, 29 (septic tanks 420, 417, 419, 486, 622, 655-1, and 655-2), 80, and 82, an "N" is shown for this pathway, because neither surface soil nor groundwater contamination is considered to be of concern; therefore, pathway 11 is not likely to be complete at these sites. For Sites 3, 33, 44 (Location I), 49, 58, and 81 (Location II), the "N" code indicates that no groundwater samples were collected, because groundwater contamination is not considered to be of concern at these sites; and the "S" code indicates that no surface soil contaminants of concern are identified. The "S" code at Site 59 indicates that neither soil nor groundwater contaminants of concern are identified. If UMDA is developed for hunting purposes, livestock (a transport mechanism for this pathway) are not likely to be present; therefore, a "T" is presented in Table 6-7* for each site. Pathway 11 is not complete for any site under future recreational land use conditions.

- Exposure Pathway 12: Consumption of Crops Irrigated by Contaminated Groundwater or Grown in Contaminated Soil--The reasons for the "N" and "S" codes shown for this pathway are the same as those presented above for pathway 11. If UMDA is developed for hunting purposes, crops (a transport mechanism for this pathway) are not likely to be present; therefore, hunters will not eat crops grown onsite, and a "T" is presented in Table 6-7* for each site. This pathway is not complete for any site under future recreational land use conditions.

6.2.2.5* Future Construction Land Use. Table 6-8* identifies exposure pathways that are considered to be complete under the future construction land use scenario. Also summarized are the reasons why other pathways are incomplete. This land use scenario differs from the other future land uses in that construction workers may

TABLE 6–8*
Summary of Operable Exposure Pathways at UMDA
Future Construction Land Use Scenario

EXPOSURE PATHWAY NUMBERS (SEE TABLE 6–1)

Site No.	1	2	3	4	5	6	7	8	9	10	11	12
1	S			N	N,T	N,T	N,T	N,T	N,T	T	T	T
2	S			N	N,T	N,T	N,T	N,T	N,T	T	T	T
3	S	S	S	N	N,T	N,T	N,T	N,T	N,T	S,T	N,S,T	N,S,T
4 flood gravel (a)				N	T	T	T	T	T	T	T	T
4 basalt (a)				N	T	S,T	T	T	S,T	T	T	T
5				N	N,T	N,T	N,T	N,T	N,T	T	T	T
6				S	N,T	N,T	N,T	N,T	N,T	T	T	T
7	S	S	S	S	N,T	N,T	N,T	N,T	N,T	S,T	N,S,T	N,S,T
8 (a)	S			S	T	T	T	T	T	T	T	T
9				N	N,T	N,T	N,T	N,T	N,T	T	T	T
10	S			S	N,T	N,T	N,T	N,T	N,T	T	T	T
11	N	N	N	N	T	S,T	T	T	S,T	N,T	T	T
12				S	T	S,T	T	T	S,T	T	T	T
13 (a)				S	T	S,T	S,T	S,T	S,T	T	T	T
14 (a)	S			S	T	S,T	S,T	S,T	S,T	T	T	T
15 (a)					T	S,T	S,T	S,T	S,T	T	T	T
16				S	T	S,T	S,T	S,T	S,T	T	T	T
17				N	N,T	N,T	N,T	N,T	N,T	T	T	T
18					T	S,T	S,T	S,T	S,T	T	T	T
19					T	S,T	T	T	S,T	T	T	T
21	S			S	N,T	N,T	N,T	N,T	N,T	T	T	T
22				S	N,T	N,T	N,T	N,T	N,T	T	T	T
25 I	S			N	N,T	N,T	N,T	N,T	N,T	T	T	T
25 II	S			N	N,T	N,T	N,T	N,T	N,T	T	T	T
26	N			N	N,T	N,T	N,T	N,T	N,T	T	T	T

TABLE 6-8* (cont'd)
Summary of Operable Exposure Pathways at UMDA
Future Construction Land Use Scenario

EXPOSURE PATHWAY NUMBERS (SEE TABLE 6-1)

Site No.	1	2	3	4	5	6	7	8	9	10	11	12
27				S	N,T	N,T	N,T	N,T	N,T	T	T	T
29 #420	N	S	S	N	N,T	N,T	N,T	N,T	N,T	S,T	N,S,T	N,S,T
29 #417	S			N	N,T	N,T	N,T	N,T	N,T	T	T	T
29 419	S			S	N,T	N,T	N,T	N,T	N,T	T	T	T
29 #486	S	S	S	N	N,T	N,T	N,T	N,T	N,T	S,T	N,S,T	N,S,T
29 #655-1					N,T	N,T	N,T	N,T	N,T	T	T	T
29 #655-2	S	S	S	S	N,T	N,T	N,T	N,T	N,T	S,T	N,S,T	N,S,T
29 #622				N	N,T	N,T	N,T	N,T	N,T	T	T	T
30				S	N,T	N,T	N,T	N,T	N,T	T	T	T
31 (a)					T	T	T	T	T	T	T	T
32 I				S	N,T	N,T	N,T	N,T	N,T	T	T	T
32 II				S	N,T	N,T	N,T	N,T	N,T	T	T	T
33	S	S	S	N	N,T	N,T	N,T	N,T	N,T	S,T	N,S,T	N,S,T
34				S	N,T	N,T	N,T	N,T	N,T	T	T	T
35				N	N,T	N,T	N,T	N,T	N,T	T	T	T
36	S			S	N,T	N,T	N,T	N,T	N,T	T	T	T
37					N,T	N,T	N,T	N,T	N,T	T	T	T
38 (a)				S	T	S,T	S,T	S,T	S,T	T	T	T
39	S			N	N,T	N,T	N,T	N,T	N,T	T	T	T
41				S	T	S,T	S,T	S,T	S,T	T	T	T
44 I	S	S	S	S	N,T	N,T	N,T	N,T	N,T	S,T	N,S,T	N,S,T
44 II	S			S	N,T	N,T	N,T	N,T	N,T	T	T	T
45 (612)	S			N	N,T	N,T	N,T	N,T	N,T	T	T	T
45 (617)	S			N	N,T	N,T	N,T	N,T	N,T	T	T	T
46				N	N,T	N,T	N,T	N,T	N,T	T	T	T

TABLE 6-8* (cont'd)
Summary of Operable Exposure Pathways at UMDA
Future Construction Land Use Scenario

EXPOSURE PATHWAY NUMBERS (SEE TABLE 6-1)

Site No.	1	2	3	4	5	6	7	8	9	10	11	12
47 (a)	■	■	■	S	T	T	T	T	T	T	T	T
48	■	■	■	S	N,T	N,T	N,T	N,T	N,T	T	T	T
49	S	S	S	N	N,T	N,T	N,T	N,T	N,T	S,T	N,S,T	N,S,T
50 (a)	S	S	S	S	T	S,T	T	T	S,T	S,T	T	T
52	■	■	■	S	N,T	N,T	N,T	N,T	N,T	T	T	T
53	■	■	■	S	N,T	N,T	N,T	N,T	N,T	T	T	T
55 (a)	■	■	■	S	T	S,T	S,T	S,T	S,T	T	T	T
56	S	■	■	S	N,T	N,T	N,T	N,T	N,T	T	T	T
57 I	■	■	■	■	T	S,T	S,T	S,T	S,T	T	T	T
57 II (a)	■	■	■	S	T	S,T	S,T	S,T	S,T	T	T	T
57 III	■	■	■	S	T	S,T	S,T	S,T	S,T	T	T	T
58	S	S	S	S	N,T	N,T	N,T	N,T	N,T	S,T	N,S,T	N,S,T
59	S	S	S	N	S,T	N,T	S,T	S,T	N,T	S,T	S,T	S,T
60	S	■	■	N	N,T	N,T	N,T	N,T	N,T	T	T	T
67 (a)	S	■	■	N	T	T	T	T	T	T	T	T
80	S	S	S	S	N,T	N,T	N,T	N,T	N,T	S,T	N,S,T	N,S,T
81 I	S	■	■	N	N,T	N,T	N,T	N,T	N,T	T	T	T
81 II	S	S	S	N	N,T	N,T	N,T	N,T	N,T	S,T	N,S,T	N,S,T
82	S	S	S	S	N,T	N,T	N,T	N,T	N,T	S,T	N,S,T	N,S,T

NOTES:

■ – Indicates that exposure pathway is complete at site.

N – Sampling was not performed since the medium and/or chemical were not considered to be of concern. Therefore, no data are available, but the pathway at the site is not likely to be complete.
S – Contaminant source applicable to the specific pathway has been shown to not exist based on sampling results or based on selection of chemicals of concern (See Section 3.0).
T – Transport medium necessary for pathway (e.g., well, for groundwater ingestion) does not exist at the site.

(a) – Groundwater data were grouped as follows for certain sites since contamination in these wells may originate from any site within the group:
Sites 4, 47, 67 (flood gravel and basalt aquifers)
Sites 8, 31
Sites 13, 57 II
Sites 14, 38
Sites 15, 55
* – Replaces original Table 6-8 in the Final Baseline RA; Dames & Moore, 1992a.

contact both surface and subsurface soil. (Other future populations are expected to encounter only surface soil.) The foundations of homes and other buildings that may be built are assumed to be dug no deeper than 10 feet. Soil-related pathways for construction workers consider contamination at depths from 0 to 10 feet.

- Exposure Pathway 1: Dermal Contact With Contaminated Soil and Subsequent Dermal Absorption--At followup fieldwork Site 11, an "N" is shown in Table 6-8*, because soil contamination is not expected to be of concern at this site, no soil samples were collected, and the pathway is not likely to be complete. An "N" is shown for Sites 6 and 29 (septic tank 420), because soil contamination with organic chemicals is not expected, organics are not included as analytes, and the pathway is not likely to be complete. According to EPA Region X guidelines (USEPA, 1991b), quantitative information on dermal absorption of inorganics from soil is not available, and dermal absorption of inorganics is assumed to be negligible (USEPA, 1991c). Therefore, an "S" code is shown for pathway 1 at those sites with only inorganic contaminants of concern in soil (i.e., Sites 1, 8, 10, 14, 21, 25 (Locations I and II), 29 (septic tanks 417 and 419), 39, 45 (Locations I and II), 56, 60, 67, and 81 (Location I), and followup fieldwork Sites 2, 26, and 36). At Sites 3, 7, 29 (septic tanks 486 and 655-2), 33, 44 (Location I), 49, 58, 59, 80, 81 (Location II), and 82, and followup fieldwork Sites 44 (Location II) and 50, no inorganic or organic contaminants of concern are identified in soil that would be contacted by future construction workers, and an "S" is presented in Table 6-8*. An "S" is presented for Sites 29 (septic tank 655-1) and 57 (Location I), because dermal absorption of the contaminants of concern is considered to be negligible. Workers involved in construction activities at the remaining sites (marked with a solid black box in Table 6-8*) may contact contaminated surface and subsurface soil and dermally absorb organic soil contaminants.

- Exposure Pathway 2: Inadvertent Ingestion of Contaminated Soil--The reasons for the "N" code at followup fieldwork Site 11; and for the "S" code at Sites 3, 7, 29 (septic tanks 486 and 655-2), 33, 44 (Location I), 49, 58, 59, 80, 81 (Location II), and 82, and followup fieldwork Site 50, are the same as those discussed above for pathway 1. An "S" is also presented for Site 29 (septic tank 420), because no contaminants of concern are identified for soil in this tank. Workers involved in construction activities at the remaining sites (marked with a solid black box in Table 6-8*) may contact and incidentally ingest contaminated surface and subsurface soil.

- Exposure Pathway 3: Inhalation of Contaminated Soil as Airborne Dust--The reason for the "N" code at followup fieldwork Site 11; and for the "S" code at Sites 3, 7, 29 (septic tanks 420, 486, and 655-2), 33, 44 (Location I), 49, 58, 59, 80, 81 (Location II), and 82, and followup fieldwork Site 50, are the same as those presented above for pathway 2. Construction workers may inhale contaminated airborne dust from the remaining sites (marked with a solid black box in Table 6-8*) or dust generated during construction.

- Exposure Pathway 4: Inhalation of Vapors Volatilized From Soil--The reasons for the "N" code at followup fieldwork Site 11 are the same as discussed above for pathway 1. In addition, contamination of the surface and subsurface soil with VOCs at Sites 1, 3, 4, 9, 25 (Locations I and II), 29 (septic tanks 420, 417, 486, and 622), 33, 35, 39, 45 (Locations I and II), 46, 49, 59, 60, 67, and 81 (Locations I and II), and followup fieldwork Sites 2, 5, 17, and 26, is not considered to be a problem; therefore, VOCs are not included as analytes at these sites, and pathway 4 is not likely to be complete (i.e., marked with an "N"). At Sites 6, 7, 8, 10, 13, 14, 16, 21, 27, 29 (septic tanks 419 and 655-2), 32, 34, 38, 41, 44 (Location I), 52, 53, 55, 56, 57 (Locations II and III), 58, 80, and 82, and followup fieldwork Sites 12, 22, 30, 36, 44 (Location II), 47, 48, and 50,

no VOCs are identified as contaminants of concern in surface or subsurface soil samples; therefore, an "S" is presented for pathway 4. Pathway 4 is considered to be complete for future construction workers who may inhale VOCs from site soil while working at the remaining sites (marked with a solid black box in Table 6-8*).

The followup fieldwork results do not change the conclusions of the Baseline RA exposure pathway evaluations for pathways 5, 6, 7, 8, and 9 under future construction land use conditions; therefore, these pathway discussions are not included in this addendum, but are summarized in Table 6-8*.

- Exposure Pathway 10: Consumption of Game That Feed on Vegetation Growing in Contaminated Soil--The reasons for the "N" code at followup fieldwork Site 11; and for the "S" code at Sites 3, 7, 29 (septic tanks 420, 486, and 655-2), 33, 44 (Location I), 49, 58, 59, 80, 81 (Location II), and 82, and followup fieldwork Site 50, are the same as those discussed above for pathway 1. The code "T" is used for all sites for this pathway, because it is unlikely that construction workers will hunt on the sites. Therefore, a transport mechanism does not exist, and pathway 10 is not considered to be complete for future construction workers at any of the study sites.

- Exposure Pathway 11: Consumption of Livestock (or Their Milk) That Feed on Vegetation Growing in Contaminated Soil or Consume Contaminated Groundwater--At Sites 3, 7, 29 (septic tanks 420, 486, and 655-2), 33, 44 (Location I), 49, 58, 80, 81 (Location II), and 82, "N" and "S" codes are shown, because groundwater was not sampled, and no contaminants of concern are identified in soil at these sites. An "S" is presented for Site 59, because neither soil nor groundwater contaminants of concern are identified. The code "T" is shown for all sites for this pathway, because a transport mechanism (cattle) does not exist, and the pathway is not considered to be complete for future construction workers at any of the study sites.

- Exposure Pathway 12: Consumption of Crops Irrigated by Contaminated Groundwater or Grown in Contaminated Soil--The reasons for the "N" and "S" codes are the same as those discussed above for pathway 11. The code "T" is shown for all sites for this pathway, because a transport mechanism (crops) does not exist, and the pathway is not considered to be complete for future construction workers at any of the study sites.

6.3* SELECTION OF EXPOSURE PATHWAYS TO BE QUANTIFIED AT UMDA

According to Risk Assessment Guidance for Superfund (RAGS; USEPA, 1989b), each potential complete exposure pathway may not necessarily require quantification if there is sound justification to eliminate it from detailed analysis. Such justification may be based on one of the following: (1) the resulting exposure is much less than that from another pathway involving the same medium at the same exposure point; (2) the potential magnitude of exposure is low; or (3) the probability of the exposure occurring is very low, and the risks associated with the occurrence are not high.

The selection of exposure pathways to be quantified under the current and future land use scenarios is discussed in Sections 6.3.1* and 6.3.2*, respectively. Tables 6-9* and 6-10* summarize operable pathways. selected for quantitative evaluation and also provide the justification for excluding certain pathways from quantification under the current and future land use scenarios, respectively. The matrix approach used to identify operable pathways that are quantitatively evaluated is described in Section 6.3 of the Baseline RA.

6.3.1* Current Land Use Scenario

For current onsite receptors, pathways 1, 2, 3, and 4 are complete at one or more UMDA sites. Although operable at Sites 37 and 46, and followup fieldwork Site 22, under current land use conditions, pathway 1 is not selected for quantitative evaluation and is marked with a "D" in Table 6-9*, because dermal absorption data

TABLE 6-9*
Evaluation of Quantification of Operable Exposure Pathways at UMDA
Current Land Use Scenario

Site No.	EXPOSURE PATHWAY NUMBERS (SEE TABLE 6-1)											
	1	2	3	4	5	6	7	8	9	10	11	12
1	I	I		I	I	I	I	I	I	I	I	I
**2	I	I	M	I	I	I	I	I	I	I	I	I
3	I	I	I	I	I	I	I	I	I	I	I	I
4 flood gravel (a)	I	I		I	I	I	I	I	I	I	I	I
4 basalt (a)	I	I		I	I	I	I	I	I	I	I	I
**5	I	I		I	I	I	I	I	I	I	I	I
6	I	I	I	I	I	I	I	I	I	I	I	I
7	I	I	I	I	I	I	I	I	I	I	I	I
8 (a)	I	I	I	I	I	I	I	I	I	I	I	I
9	I	I		I	I	I	I	I	I	I	I	I
10	I	I		I	I	I	I	I	I	I	I	I
**11	I	I	I	I	I	I	I	I	I	I	I	I
**12	I	I	M	I	I	I	I	I	I	I	I	I
13 (a)	I	I	I	I	I	I	I	I	I	I	I	I
14 (a)	I	I	I	I	I	I	I	I	I	I	I	I
**15 (a)	I	I		I	I	I	I	I	I	I	I	I
16	I	I		I	I	I	I	I	I	I	I	I
**17	I	I	I	I	I	I	I	I	I	I	I	I
**18	I	I		M,A	I	I	I	I	I	I	I	I
**19	I	I		I	I	I	I	I	I	I	I	I
21	I	I		I	I	I	I	I	I	I	I	I
**22	D			I	I	I	I	I	I	I	I	I
25 I	I	I		I	I	I	I	I	I	I	I	I
25 II	I	I		I	I	I	I	I	I	I	I	I
**26	I	I		I	I	I	I	I	I	I	I	I

TABLE 6-9* (cont'd)
Evaluation of Quantification of Operable Exposure Pathways at UMDA
Current Land Use Scenario

EXPOSURE PATHWAY NUMBERS (SEE TABLE 6-1)

Site No.	1	2	3	4	5	6	7	8	9	10	11	12
27	I	I		I	I	I	I	I	I	I	I	I
29 #420	I	I	I	I	I	I	I	I	I	I	I	I
29 #417	I	I	I	I	I	I	I	I	I	I	I	I
29 #419	I	I	I	I	I	I	I	I	I	I	I	I
29 #486	I	I	I	I	I	I	I	I	I	I	I	I
29 #655-1	I	I	I	I	I	I	I	I	I	I	I	I
29 #655-2	I	I	I	I	I	I	I	I	I	I	I	I
29 #622	I	I	I	I	I	I	I	I	I	I	I	I
**30	I	I	I	I	I	I	I	I	I	I	I	I
31 (a)	I	I		I	I	I	I	I	I	I	I	I
32 I	I	I		I	I	I	I	I	I	I	I	I
32 II	I	I		I	I	I	I	I	I	I	I	I
33	I	I	I	I	I	I	I	I	I	I	I	I
34	I	I	I	I	I	I	I	I	I	I	I	I
35	I	I	I	I	I	I	I	I	I	I	I	I
**36	I	I		I	I	I	I	I	I	I	I	I
37	D			M,A	I	I	I	I	I	I	I	I
38 (a)	I	I		I	I	I	I	I	I	I	I	I
39	I	I		I	I	I	I	I	I	I	I	I
41	I	I		I	I	I	I	I	I	I	I	I
44 I	I	I	I	I	I	I	I	I	I	I	I	I
**44 II	I	I	M	I	I	I	I	I	I	I	I	I
45 (612)	I	I		I	I	I	I	I	I	I	I	I
45 (617)	I	I		I	I	I	I	I	I	I	I	I
46	D			I	I	I	I	I	I	I	I	I

TABLE 6–9* (cont'd)
Evaluation of Quantification of Operable Exposure Pathways at UMDA
Current Land Use Scenario

Site No.	EXPOSURE PATHWAY NUMBERS (SEE TABLE 6–1)											
	1	2	3	4	5	6	7	8	9	10	11	12
49	I	I	I	I	I	I	I	I	I	I	I	I
50 (a)	I	I	I	I	I	I	I	I	I	I	I	I
52	I	I	■	I	I	I	I	I	I	I	I	I
53	I	I	■	I	I	I	I	I	I	I	I	I
55 (a)	I	I	I	I	I	I	I	I	I	I	I	I
56	I	I	I	I	I	I	I	I	I	I	I	I
57 I	I	I	■	I	I	I	I	I	I	I	I	I
57 II	I	I	■	I	I	I	I	I	I	I	I	I
57 III	I	I	■	I	I	I	I	I	I	I	I	I
58	I	I	I	I	I	I	I	I	I	I	I	I
59	I	I	I	I	I	I	I	I	I	I	I	I
60	I	■	■	I	I	I	I	I	I	I	I	I
67 (a)	I	I	■	I	I	I	I	I	I	I	I	I
80	I	I	I	I	I	I	I	I	I	I	I	I
81 I	I	I	■	I	I	I	I	I	I	I	I	I
81 II	I	I	I	I	I	I	I	I	I	I	I	I
82	I	I	I	I	I	I	I	I	I	I	I	I

NOTES:

■ – Indicates that the exposure pathway will be quantified for the site.

I – The pathway is incomplete for the reasons indicated in Table 6–2.
M – The pathway is excluded from quantification because the potential magnitude of exposure is small and associated risks are low.
A – The pathway is excluded from quantification because the expected exposure and risks are much less than from another pathway involving the same medium and exposure point.
D – Pathways excluded, because data on dermal absorption of all contaminants of concern from soil are not available.

(a) – Groundwater data were grouped as follows for certain sites since contamination in these wells may originate from any site within the group:
Sites 4, 47, 67 (flood gravel and basalt aquifers)
Sites 8, 31
Sites 13, 57 II
Sites 14, 38
Sties 15, 55

* – Replaces original Table 6–9 in the Final Baseline RA; Dames & Moore, 1992a.

TABLE 6-10*

Evaluation of Quantification of Operable Exposure Pathways at UMDA

Future Residential Land Use Scenario

Site No.	EXPOSURE PATHWAY NUMBERS (SEE TABLE 6-1) 1	2	3	4	5	6	7	8	9	10	11	12
1	I			I	I	I	I	I	I	I	A	
**2	I			I	I	I	I	I	I	I	A	
3	I	I	I	I	I	I	I	I	I	I	I	I
4 flood gravel (a)				I				A	A	I	A	
4 basalt (a)				I		I		A	I	I	A	
**5				I	I	I	I	I	I	I	A	
6	I	I	I	I	I	I	I	I	I	I	I	I
7	I	I	I	I	I	I	I	I	I	I	I	I
8 (a)	I	I	I	I				A	A	I	A	
9				I	I	I	I	I	I	I	A	
10	I			I	I	I	I	I	I	I	A	
**11	I	I	I	I		I		A	I	I	A	
**12	D			I		I		A	I	I	A	
13 (a)				I		I	I	I	I	I	A	
14 (a)	I			I		I	I	I	I	I	A	
**15 (a)				I		I	I	I	I	I	A	
16				I		I	I	I	I	I	A	
**17				I	I	I	I	I	I	I	A	
**18	D			M,A		I	I	I	I	I	A	
**19				I		I		A	I	I	A	
21	I			I	I	I	I	I	I	I	A	
**22	D			I	I	I	I	I	I	I	A	
25 I	I			I	I	I	I	I	I	I	A	
25 II	I			I	I	I	I	I	I	I	A	
**26	I			I	I	I	I	I	I	I	A	
27	D			I	I	I	I	I	I	I	A	

TABLE 6-10* (cont'd)
Evaluation of Quantification of Operable Exposure Pathways at UMDA
Future Residential Land Use Scenario

Site No.	EXPOSURE PATHWAY NUMBERS (SEE TABLE 6-1)											
	1	2	3	4	5	6	7	8	9	10	11	12
29 #420	I	I	I	I	I	I	I	I	I	I	I	I
29 #417	I	I	I	I	I	I	I	I	I	I	I	I
29 #419	I	I	I	I	I	I	I	I	I	I	I	I
29 #486	I	I	I	I	I	I	I	I	I	I	I	I
29 #655-1	I	I	I	I	I	I	I	I	I	I	I	I
29 #655-2	I	I	I	I	I	I	I	I	I	I	I	I
29 #622	I	I	I	I	I	I	I	I	I	I	I	I
**30	D			I	I	I	I	I	I	I	A	
31 (a)				I				A	A	I		
32 I				I	I	I	I	I	I	I	A	
32 II				I	I	I	I	I	I	I	A	
33	I	I	I	I	I	I	I	I	I	I	I	I
34	D			I	I	I	I	I	I	I	A	
35	D			I	I	I	I	I	I	I	A	
**36	I			I	I	I	I	I	I	I	A	
37	D			M,A	I	I	I	I	I	I	A	
38 (a)				I		I	I	I	I	I	A	
39	I			I	I	I	I	I	I	I	A	
41	D			I		I	I	I	I	I	A	
44 I	I	I	I	I	I	I	I	I	I	I	I	I
**44 II	I			I	I	I	I	I	I	I	A	
45 (612)	I			I	I	I	I	I	I	I	A	
45 (617)	I			I	I	I	I	I	I	I	A	
46	D			I	I	I	I	I	I	I	A	

TABLE 6-10* (cont'd)
Evaluation of Quantification of Operable Exposure Pathways at UMDA
Future Residential Land Use Scenario

EXPOSURE PATHWAY NUMBERS (SEE TABLE 6-1)

Site No.	1	2	3	4	5	6	7	8	9	10	11	12
49	I	I	I	I	I	I	I	I	I	I	I	I
50 (a)	I	I	I	I	■	I	■	A	I	I	A	■
52	■	■	■	I	I	I	I	I	I	I	A	■
53	D	■	■	I	I	I	I	I	I	I	A	■
55 (a)	I	I	I	I	■	I	I	I	I	I	A	■
56	I	■	■	I	I	I	I	I	I	I	A	■
57 I	I	■	■	I	■	I	I	I	I	I	A	■
57 II	■	■	■	I	■	I	I	I	I	I	A	■
57 III	I	■	■	I	■	I	I	I	I	I	A	■
58	I	I	I	I	I	I	I	I	I	I	I	I
59	I	I	I	I	I	I	I	I	I	I	I	I
60	I	■	■	I	I	I	I	I	I	I	A	■
67 (a)	I	■	■	I	■	■	■	A	A	I	A	■
80	I	I	I	I	I	I	I	I	I	I	I	I
81 I	I	■	■	I	I	I	I	I	I	I	A	■
81 II	I	I	I	I	I	I	I	I	I	I	I	I
82	I	I	I	I	I	I	I	I	I	I	I	I

NOTES:

■ – Indicates that the exposure pathway will be quantified for the site.

I – The pathway is incomplete for the reasons indicated in Table 6-2.
M – The pathway is excluded from quantification because the potential magnitude of exposure is small and associated risks are low.
A – The pathway is excluded from quantification because the expected exposure and risks are much less than from another pathway involving the same medium and exposure point.
D – Pathway excluded because data on dermal absorption of all contaminants of concern from soil are not available.

(a) – Groundwater data were grouped as follows for certain sites since contamination in these wells may originate from any site within the group:

Sites 4, 47, 67 (flood gravel and basalt aquifers)
Sites 8, 31
Sites 13, 57 II
Sites 14, 38
Sties 15, 55

* – Replaces original Table 6-10 in the Final Baseline RA; Dames & Moore, 1992a.

are not available for the organic contaminants of concern in soil at these sites (i.e., for tetrachloroethylene and bis(2-ethylhexyl)phthalate at Site 37, PAHs at Site 46, and pesticides at Site 22).

Pathway 2 is selected for quantitative evaluation for onsite receptors at all sites at which it is complete--Sites 37, 46, and 60, and followup fieldwork Site 22.

Pathway 3 is quantitatively evaluated for offsite receptors located east of UMDA, in the predominant downwind direction, and west of UMDA, near dust-generating operations in the ADA Area. With the exception of followup fieldwork Sites 2, 12, and 44 (Location II), pathway 3 is selected for quantitative evaluation for onsite receptors at all sites at which it is complete--Sites 1, 4, 9, 10, 16, 21, 25 (Locations I and II), 27, 31, 32 (Locations I and II), 37, 38, 39, 41, 45 (Buildings 612 and 617), 46, 52, 53, 57 (Locations I, II, and III), 60, 67, and 81 (Location I), and followup fieldwork Sites 5, 15, 18, 19, 22, 26, 36, and 47. This pathway is not selected for quantitative evaluation and is marked with an "M" at Sites 2, 12, and 44 (Location II), because these sites are small areas located far from any receptors, with generally low levels of detected contaminants. The potential magnitude of an onsite receptor's exposure to contamination from these sites via pathway 3 is considered to be small, and the associated risks are low.

Although operable at Site 37 and followup fieldwork Site 18 under current land use conditions, pathway 4 is not selected for quantitative evaluation and is marked with an "M" and an "A" in Table 6-9*, because: (1) only two VOAs (tetrachloroethylene at Site 37 and 1,1,1-trichloroethane at Site 18) are identified as contaminants of concern in soil; (2) the 95 percent UCL concentrations of these VOAs are very low (e.g., 0.005 milligram per kilogram (mg/kg) for tetrachloroethylene, compared to a detection limit of 0.006 mg/kg; and 0.007 mg/kg for 1,1,1-trichloroethane, compared to a detection limit of 0.004 mg/kg); and (3) the risks and hazards associated with pathway 4 are likely to be much lower than those for the other three soil exposure pathways (pathways 1, 2, and 3), which are quantified for applicable current land use scenarios.

As discussed in Section 6.2.1.13*, though the ingestion of apples from an orchard that may have received airborne dust from contaminated soil at the installation may be a complete pathway under current land use conditions, the likelihood of this pathway being complete is low. In addition, the risks and hazards associated with the indirect pathway of ingestion of apples are likely to be much lower than those for the other three direct soil exposure pathways (pathways 1, 2, and 3), which are quantified for applicable current land use scenarios. Therefore, this pathway is not selected for quantitative evaluation.

In summary, the following operable pathways are quantified under current land use conditions:

- Pathway 2--Inadvertent ingestion of contaminated soil.

  For the DRMO employee at followup fieldwork Site 22, workers near the SW warehouse area at Sites 37 and 46, and target range users at Site 60.

- Pathway 3--Inhalation of contaminated soil as airborne dust.

  For receptors and sites listed above.

6.3.2* Future Land Use Scenario

Of the possible future land uses discussed in Section 6.1.2 of the Baseline RA (i.e., residential, light industrial, military, construction, agricultural, and recreational), residential use is expected to yield the highest exposures because of the long exposure frequency and duration for this population. Under the future residential land use scenario, if none of the pathways evaluated or their combinations present a risk in excess of 1E-06 or a hazard index in excess of 1 for a particular site, the risks and hazards for less conservative land use scenarios (i.e., industrial, military, agricultural, recreational, and construction) are not expected to exceed these levels. Therefore, as discussed in Section 6.3.2.1*, the future residential land use scenario is selected for quantification at all applicable sites.

The assumption that the residential scenario is the most conservative and, therefore, the appropriate scenario to consider when estimating risks and hazards is verified in the Baseline RA (Section 6.3.2.2) by estimating risks and hazards for other potential future land uses (i.e., military, industrial, recreational, construction, agricultural) at one site--Site 31.

The only future nonresidential scenario to be quantitatively evaluated (except for Site 31 in the Baseline RA, as discussed above) is future military use by Oregon National Guard personnel who may use sites in Operable Unit B for tank training exercises (Section 6.1.2.1 of the Baseline RA). As discussed in Section 6.2.2.2*, only pathway 3 (inhalation of contaminated soil as airborne dust) is considered to be complete for this future land use scenario. Pathway 3 is quantitatively evaluated for future military personnel at each Operable Unit B followup fieldwork site at which it is complete (i.e., Sites 15, 17, 18, and 19).

6.3.2.1* Future Residential Land Use Scenario. Table 6-10* lists by site those operable pathways to be quantitatively evaluated under the future residential land use scenario. For future residents, the following seven pathways are quantitatively evaluated at every followup fieldwork site where they are complete (i.e., those marked with a solid black box in Table 6-10*):

- Pathway 1--Dermal contact with contaminated soil and subsequent dermal absorption.
- Pathway 2--Inadvertent ingestion of contaminated soil.
- Pathway 3--Inhalation of contaminated soil as airborne dust.
- Pathway 5--Ingestion of contaminated drinking water.
- Pathway 6--Inhalation of VOCs emitted from groundwater during showering.
- Pathway 7--Direct contact with contaminated groundwater during showering, with subsequent dermal absorption of contaminants.

- Pathway 12--Consumption of crops irrigated by contaminated groundwater or grown in contaminated soil.

These are the most conservative pathways (i.e., most likely to drive a risk or hazard). Pathway 11 is quantitatively evaluated for Site 31, as discussed in Section 6.3.2.2 of the Baseline RA.

Although operable at Sites 27, 34, 35, 37, 41, 46, and 53, and followup fieldwork Sites 12, 18, 22, 30, and 48, under future residential land use conditions, pathway 1 is not selected for quantitative evaluation and is marked with a "D" in Table 6-10*, because dermal absorption data are not available for the organic contaminants of concern in soil at these sites.

Although pathway 4 is operable at Site 37 and followup fieldwork Site 18 under the future residential land use scenario, it is not selected for quantitative evaluation and is marked with an "M" and an "A" in Table 6-10*, because: (1) only two VOAs (tetrachloroethylene at Site 37 and 1,1,1-trichloroethane at Site 18) are identified as contaminants of concern in soil; (2) the 95 percent UCL concentrations of these VOAs are very low (e.g., 0.005 mg/kg for tetrachloroethylene, compared to a detection limit of 0.006 mg/kg; and 0.007 mg/kg for 1,1,1-trichloroethane, compared to a detection limit of 0.004 mg/kg); and (3) the risks and hazards associated with pathway 4 are likely to be much lower than for the other three soil exposure pathways (pathways 1, 2, and 3), which are quantified for future residents.

Although operable at Sites 4, 8, 31, and 67, and followup fieldwork Sites 11, 12, 19, 47, and 50, pathway 8 (dermal absorption of contaminants in groundwater during nonshowering use) is not selected for quantitative evaluation and is marked with an "A" in Table 6-10*. The exposures and risks/hazards are expected to be much less for pathway 8 than for pathway 7 (direct contact with contaminated groundwater during showering, with subsequent dermal absorption of contaminants), which is being quantified.

Pathway 9 (inhalation of vapors during nonshowering use of groundwater)--though operable at Sites 4 (flood gravel aquifer), 8, 31, and 67, and followup fieldwork Site 47--is not selected for quantitative evaluation and is marked with an "A" in Table 6-10*. The exposures and risks/hazards are expected to be much less for pathway 9 than for pathway 6 (inhalation of VOCs emitted from groundwater during showering), which is being quantitatively evaluated.

Pathway 10 (consumption of game that feed on vegetation growing in contaminated soil) is not complete for any sites under the future residential land use scenario.

Although operable at Sites 1, 4, 8, 9, 10, 13, 14, 16, 21, 25 (Locations I and II), 27, 32 (Locations I and II), 34, 35, 37, 38, 39, 41, 45 (Buildings 612 and 617), 46, 52, 53, 55, 56, 57 (Locations I, II, and III), 60, 67, and 81 (Location I), and the 16 followup fieldwork sites, pathway 11 (consumption of livestock or their milk that feed on vegetation growing in contaminated soil and/or consume contaminated groundwater) is not selected for quantitative evaluation and is marked with an "A" in Table 6-10*. The exposures and risks/hazards are expected to be much less for pathway 11 than for other pathways involving the same media and exposure point. Pathway 11 is quantitatively evaluated for Site 31, which (as discussed above) underwent comprehensive analysis in Section 6.3.2.2 of the Baseline RA.

6.4* METHODOLOGY TO QUANTIFY SELECTED EXPOSURE PATHWAYS

Although unchanged from the Final Baseline RA, tables summarizing the quantitative details needed to calculate intakes of contaminants by each of the exposure pathways quantitatively evaluated in this addendum are repeated herein for informational purposes (i.e., Tables 6-11*, 6-12*, 6-13*, 6-14*, 6-15*, 6-16*, 6-21*, and 6-23*).

TABLE 6-11*

Quantitative Summary of Exposure Pathway 1
Future Land Use Scenario

Description:	Direct contact with contaminated soil and subsequent dermal absorption of contaminants.
Exposure Point Concentration:	95 percent upper confidence limit on the arithmetic mean chemical concentration.
Absorbed Dose Formula:	$\text{Absorbed Dose} = \frac{CS \times CF \times SA \times CR \times ABS \times EF \times ED}{BW \times AT}$
Parameter Definitions and Units:	Absorbed Dose (mg/kg-day) CS = Exposure point chemical concentration in soil (mg/kg) CF = Conversion factor (kg/mg) SA = Skin surface area available for contact (cm2/day) CR = contact rate (mg/cm2) ABS = Dermal absorption factor (unitless) EF = Exposure frequency (days/year) ED = Exposure duration (years) BW = Body weight (kg) AT = Averaging time (days)
Assumptions	
Residential:	CF = 1E-06 kg/mg SA = 5000 cm2/day, adult (summer), 1900 cm2/day, adult (winter), for an average SA of 3450 cm2/day; 3900 cm2/day, child (USEPA, 1991b) CR = 1.0 mg/cm2 (USEPA, 1991b) ABS = chemical specific (see text) EF = 350 days/year, adult and child (USEPA, 1991b) ED = 24 years for adults; 6 years for children (USEPA, 1991b) BW = 70 kg, adult; 15 kg, child (USEPA, 1991b) AT = 70 years x 365 days/year = 25,550 days (carcinogens; USEPA, 1991b) = 30 years x 365 days/year = 10,950 days for noncarcinogens (USEPA, 1991b)
Light Industrial:	CF = 1E-06 kg/mg SA = 4,400 cm2/day (adult upper extremities and head; USEPA, 1989a) CR = 1.0 mg/cm2 (USEPA, 1991b) ABS = chemical specific (see residential scenario) EF = 250 days/yr (USEPA, 1991b) ED = 25 years (USEPA, 1991b) BW = 70 kg, adult (USEPA, 1991b) AT = 70 years x 365 days/year = 25,550 days (carcinogens; USEPA, 1991b) = 25 years x 365 days/year = 9,125 days for adults (noncarcinogens; USEPA, 1991b)
Military:	CF = 1E-06 kg/mg SA = 4,400 cm2/day (adult upper extremities and head; USEPA, 1989a) CR = 1.0 mg/cm2 (USEPA, 1991b) ABS = chemical specific (see residential scenario) EF = 250 days/yr (USEPA, 1991b) ED = 3 years (estimated duration of tour of duty) BW = 75 kg (USEPA, 1989a) AT = 70 years x 365 days/year = 25,550 days (carcinogens; USEPA, 1991b) = 3 years x 365 days/year = 1,095 days for adults (noncarcinogens; USEPA, 1991b)

TABLE 6-11* (con't)

Quantitative Summary of Exposure Pathway 1
Future Land Use Scenario

Construction Workers:

CF = 1E-06 kg/mg
SA = 4,400 cm2/day (adult upper extremities and head; USEPA, 1989a)
CR = 1.0 mg/cm2 (USEPA, 1991b)
ABS = chemical specific (see residential scenario)
EF = 167 days/yr (estimated as 2/3 of available workdays because of inclement weather, winter, etc.)
ED = 2 years (estimated duration of construction project)
BW = 70 kg, adult (USEPA, 1991b)
AT = 70 years x 365 days/year = 25,550 days for carcinogens (USEPA, 1991b)
= 2 years x 365 days/year = 730 days for noncarcinogens

Farmers and Farm Workers:

CF = 1E-06 kg/mg
SA = 4,400 cm2/day (adult upper extremities and head; USEPA, 1989a)
CR = 1.0 mg/cm2 (USEPA, 1991b)
ABS = chemical specific (see residential scenario)
EF = 30 days/yr (estimated number of days/year working in contaminated area)
ED = 40 years (estimated duration of farmer's career)
BW = 70 kg, adult (USEPA, 1991b)
AT = 70 years x 365 days/year = 25,550 days for carcinogens (USEPA, 1991b)
= 40 years x 365 days/year = 14,600 days for noncarcinogens

Sample Calculation:

Residential:

Absorbed Dose = [[(CS (mg/kg) x 1E-06 (kg/mg) x 3,900 (cm2/day) x 1.0 (mg/cm2) x ABS x 350 (days/yr) x 6 (yrs))/15 (kg)] + [(CS (mg/kg) x 1E-06 (kg/mg) x 3,450 (cm2/day) x 1.0 (mg/cm2) x ABS x 350 (days/yr) x 24 (yrs))/70 (kg)]] / 25,550 (or 10,950) (days)

= CS (mg/kg) x ABS x 3.76E-05 (1/day)(carcinogens)
= CS (mg/kg) x ABS x 8.77E-05 (1/day)(noncarcinogens)

TABLE 6-12*

Quantitative Summary of Exposure Pathway 2
Current Land Use Scenario

Description: Inadvertent ingestion of contaminated soil by adults at UMDA.

Exposure Point Concentration: 95 percent upper confidence limit on the arithmetic mean chemical concentration.

Intake Formula:

$$\text{Intake} = \frac{CS \times IR \times CF \times EF \times ED}{BW \times AT}$$

Parameter Definitions and Units:

Intake in (mg/kg-day)
CS = Exposure point chemical concentration in soil (mg/kg)
IR = Ingestion rate (mg soil/day)
CF = Conversion factor (kg/mg)
EF = Exposure frequency (days/year)
ED = Exposure duration (years)
BW = Body weight (kg)
AT = Averaging time (days)

Assumptions:

For All Sites:

CF = 1E-06 kg/mg
BW = 70 kg, adult (USEPA, 1991b)

Site-Specific:

Site 22, DRMO Worker

IR = 50 mg/day (USEPA, 1991b)
EF = [0.5 (Mitchell, 1991)] x [250 days/year (USEPA, 1991b)] x [0.1 (assumed fraction of outdoor time spent off forklift, not wearing gloves)] = 12.5 days/yr
ED = 10 years (USEPA, 1991b)
AT = 70 years x 365 days/yr = 25,550 days (carcinogens, USEPA, 1991b)
= 10 years x 365 days/yr = 3,650 days (noncarcinogens, USEPA, 1991b)

Sites 37 & 46, Worker Near SW Warehouse Area

IR = [50 mg/day (USEPA, 1991b)] x (1 hour/8 hours) = 6.25 mg/day
EF = [0.1 (assumed time spent outdoors onsite)] x [250 days/yr (USEPA, 1991b) = 25 days/yr
ED = 25 years (USEPA, 1991b)
AT = 70 years x 365 days/yr = 25,550 days (carcinogens, USEPA, 1991b)
= 25 years x 365 days/yr = 9,125 days (noncarcinogens, USEPA, 1991b)

Site 60, Target Range Users

IR = [50 mg/day (USEPA, 1991b)] x (2 hours/8 hours) = 12.5 mg/day
EF = 5 days/month x 12 months/year = 60 days/year (Lamphear, 1991)
ED = 9 years (Lamphear, 1991)
AT = 70 years x 365 days/yr = 25,550 days (carcinogens, USEPA, 1991b)
= 9 years x 365 days/yr = 3,285 days (noncarcinogens, USEPA, 1991b)

Sample Calculation:

Site 22, DRMO Worker

$$\text{Intake} = \frac{CS\ (mg/kg) \times 50\ (mg/day) \times 1E\text{-}06\ (kg/mg) \times 12.5\ (days/yr) \times 10\ (yrs)}{70\ (kg) \times 25{,}550\ (\text{or } 3{,}650)\ (days)}$$

= CS (mg/kg) x 3.49E-09 (1/day) (carcinogens)
= CS (mg/kg) x 2.45E-08 (1/day) (noncarcinogens)

TABLE 6-13 *

Quantitative Summary of Exposure Pathway 2
Future Land Use Scenario

Description: Inadvertent ingestion of soil.

Exposure Point Concentration: 95 percent upper confidence limit on the arithmetic mean chemical concentration.

Intake Formula:

$$\text{Intake} = \frac{CS \times IR \times CF \times EF \times ED}{BW \times AT}$$

Parameter Definitions and Units:

Intake in (mg/kg-day)
CS = Exposure point chemical concentration in soil (mg/kg)
IR = Ingestion rate (mg soil/day)
CF = Conversion factor (kg/mg)
EF = Exposure frequency (days/year)
ED = Exposure duration (years)
BW = Body weight (kg)
AT = Averaging time (days)

Assumptions:

Residential:

IR = 100 mg/day for adults (USEPA, 1991b)
= 200 mg/day for children (USEPA, 1991b)
CF = 1E-06 kg/mg
EF = 350 days/yr adult and child (USEPA, 1991b)
ED = 24 years for adults; 6 years for children (USEPA, 1991b)
BW = 70 kg, adult; 15 kg, child (USEPA,1991b)
AT = 70 years x 365 days/year = 25,550 days for carcinogens (USEPA, 1991b)
= 30 years x 365 days/year = 10,950 days for noncarcinogens (USEPA, 1991b)

Light Industrial:

IR = 50 mg/day (USEPA, 1991b)
CF = 1E-06 kg/mg
EF = 250 days/yr (USEPA, 1991b)
ED = 25 years (USEPA, 1991b)
BW = 70 kg (USEPA, 1991b)
AT = 70 years x 365 days/year = 25,550 days for carcinogens (USEPA, 1991b)
= 25 years x 365 days/year = 9,125 days for noncarcinogens (USEPA, 1991b)

Military Land Use:

IR = 50 mg/day (USEPA, 1991b)
CF = 1E-06 kg/mg
EF = 250 days/yr (USEPA, 1991b)
ED = 3 years (estimated duration of tour of duty)
BW = 75 kg (USEPA, 1989a)
AT = 70 years x 365 days/year = 25,550 days for carcinogens (USEPA, 1991b)
= 3 years x 365 days/year = 1,095 days for noncarcinogens (USEPA, 1991b)

Construction Workers:

IR = 480 mg/day (adult outdoor work; USEPA, 1989a)
CF = 1E-06 kg/mg
EF = 167 days/yr (estimated as 2/3 of available workdays because of inclement weather, winter, etc.)
ED = 2 years (estimated duration of construction project)
BW = 70 kg (USEPA, 1991b)
AT = 70 years x 365 days/year = 25,550 days for carcinogens (USEPA, 1991b)
= 2 years x 365 days/year = 730 days for noncarcinogens (USEPA, 1991b)

TABLE 6-13* (cont'd)

Quantitative Summary of Exposure Pathway 2
Future Land Use Scenario

Farmers and Farm Workers: IR = 480 mg/day (adult outdoor work; USEPA, 1989a)
CF = 1E-06 kg/mg
EF = 30 days/yr (estimated number of days/year working in contaminated area)
ED = 40 years (estimated duration of farmer's career)
BW = 70 kg (USEPA, 1991b)
AT = 70 years x 365 days/year = 25,550 days for carcinogens (USEPA, 1991b)
= 40 years x 365 days/year = 14,600 days for noncarcinogens (USEPA, 1991b)

Sample Calculation:
Residential Adult:

$$\text{Intake} = \frac{[(\text{CS (mg/kg)} \times 200 \text{ (mg/day)} \times 1\text{E-06 (kg/mg)} \times 350 \text{ (days/yr)} \times 6 \text{ (years)})/15 \text{ kg}] + [(\text{CS (mg/kg)} \times 100 \text{ (mg/day)} \times 1\text{E-06 (kg/mg)} \times 350 \text{ (days/yr)} \times 24 \text{ (years)})/70 \text{ kg}]}{25{,}550 \text{ (or } 10{,}950\text{) (days)}}$$

= CS (mg/kg) x 1.57E-06 (1/day) (carcinogens)
= CS (mg/kg) x 3.65E-06 (1/day) (noncarcinogens)

TABLE 6-14*

Quantitative Summary of Exposure Pathway 3
Current Land Use Scenario

Description:	Inhalation of contaminated soil as airborne dust.
Exposure Point Concentration:	Determined according to Equation B below, using airborne dust concentration calculated by analytical model presented in Appendix E.
Intake Formula:	$$\text{Intake} = \frac{CA \times IR \times EF \times ED}{BW \times AT} \quad \text{(Equation A)}$$ $$CA = CD \times CS \times CF \quad \text{(Equation B)}$$
Parameter Definitions and Units: (Equation A):	Intake in (mg/kg–day) CA = Contaminant concentration in air (Equation B; mg/m3) IR = Inhalation rate (m3/day) EF = Exposure frequency (days/year) ED = Exposure duration (years) BW = Body weight (kg) AT = Averaging time (days)
(Equation B):	CD = Concentration of dust in air at exposure point (See Appendix E; mg dust/m3) CS = Contaminant concentration in soil (mg/kg) CF = Conversion factor (1E–06 kg/mg)
Assumptions: For All Sites:	CF = 1E–06 kg/mg BW = 70 kg (adult; USEPA, 1991b)
Receptor-Specific: Worker Near Explosives Washout Area	IR = 20 m3/workday (USEPA, 1991b) EF = 250 days/year (USEPA, 1991b) ED = 25 years (USEPA, 1991b) AT = 70 years x 365 days/yr = 25,550 days (carcinogens, USEPA, 1991b) = 25 years x 365 days/yr = 9,125 days (noncarcinogens; USEPA, 1991b)
OD Pit Workers	IR = [20 m3/workday (USEPA, 1991b)] x [7 hours/8 hours (Lamaroo, 1991)] = 17.5 m3/day EF = 40% (Lamaroo, 1991) of 250 days/year = 100 days/year ED = 15 years (Lamaroo, 1991) AT = 70 years x 365 days/yr = 25,550 days (carcinogens, USEPA, 1991b) = 15 years x 365 days/yr = 5,475 days (noncarcinogens; Lamaroo, 1991)
DRMO Worker	IR = 20 m3/workday (USEPA, 1991b) EF = 250 days/year (USEPA, 1991b) ED = 10 years (Mitchell, 1991) AT = 70 years x 365 days/yr = 25,550 days (carcinogens, USEPA, 1991b) = 10 years x 365 days/yr = 3,650 days (noncarcinogens; Mitchell, 1991)
Worker in Pesticide Bldg.	IR = [20 m3/workday (USEPA, 1991b)] x [1 hour/8 hours (Ryan, 1991)] = 2.5 m3/day EF = 10% (Ryan, 1991) of 250 days/year = 25 days/year ED = 25 years (Ryan, 1991) AT = 70 years x 365 days/yr = 25,550 days (carcinogens, USEPA, 1991b) = 25 years x 365 days/yr = 9,125 days (noncarcinogens; Ryan, 1991)

TABLE 6-14*(cont'd)

Quantitative Summary of Exposure Pathway 3
Current Land Use Scenario

Open Burning Tray Workers	IR = [20 m3/workday (USEPA, 1991b)] x [5 hours/8 hours (Lamaroo, 1991)] = 12.5 m3/day EF = 40% (Lamaroo, 1991) of 250 days/year = 100 days/year ED = 15 years (Lamaroo, 1991) AT = 70 years x 365 days/yr = 25,550 days (carcinogens, USEPA, 1991b) = 15 years x 365 days/yr = 5,475 days (noncarcinogens; Lamaroo, 1991)
Workers Near SW Warehouse Area	IR = 20 m3/workday (USEPA, 1991b) EF = 250 days/year (USEPA, 1991b) ED = 25 years (USEPA, 1991b) AT = 70 years x 365 days/yr = 25,550 days (carcinogens, USEPA, 1991b) = 25 years x 365 days/yr = 9,125 days (noncarcinogens; USEPA, 1991b)
Bldgs 612 & 617 Workers	IR = [20 m3/workday (USEPA, 1991b)] x [1 hour/8 hours (Ryan, 1991)] = 2.5 m3/day EF = 250 days/year (USEPA, 1991b) ED = 25 years (Ryan, 1991; USEPA, 1991b)) AT = 70 years x 365 days/yr = 25,550 days (carcinogens, USEPA, 1991b) = 25 years x 365 days/yr = 9,125 days (noncarcinogens; USEPA, 1991b)
Target Range Users	IR = [20 m3/workday (USEPA, 1991b)] x [2 hours/8 hours (Lamaroo, 1991)] = 5 m3/day EF = 5 days/month x 12 months/yr = 60 days/year (Lamaroo, 1991) ED = 9 years (Lamaroo, 1991) AT = 70 years x 365 days/yr = 25,550 days (carcinogens, USEPA, 1991b) = 9 years x 365 days/yr = 3,285 days (noncarcinogens; Lamaroo, 1991)
Eastern & Western Boundary Residents	IR = 20 m3/workday (USEPA, 1991b) EF = 350 days/year (USEPA, 1991b) ED = 30 years (USEPA, 1991b) AT = 70 years x 365 days/yr = 25,550 days (carcinogens, USEPA, 1991b) = 30 years x 365 days/yr = 10,950 days (noncarcinogens; USEPA, 1991b)
Hermiston & Irrigon Residents	IR = 20 m3/workday (USEPA, 1991b) EF = 350 days/year (USEPA, 1991b) ED = 30 years (USEPA, 1991b) AT = 70 years x 365 days/yr = 25,550 days (carcinogens, USEPA, 1991b) = 30 years x 365 days/yr = 10,950 days (noncarcinogens; USEPA, 1991b)

Sample Calculation:
Worker Near Explosives Washout Area:

(Equation A):

$$\text{Intake} = \frac{\text{CA (mg/m3) x 20 (m3/day) x 250 (day/yr) x 25 (yr)}}{\text{70 (kg) x 25,550 (or 9,125) (days)}}$$

= CA (mg/m3) x 6.99E-02 (m3/kg-day) (carcinogens)
= CA (mg/m3) x 1.96E-01 (m3/kg-day) (noncarcinogens)

(Equation B): CA (mg/m3) = CD (mg/m3) x CS (mg/kg) x 1E-06 (kg/mg)

TABLE 6-15*

Quantitative Summary of Exposure Pathway 3
Future Land Use Scenario

Description:	Inhalation of contaminated soil as airborne dust.
Exposure Point Concentration:	Determined according to Equation B below, using airborne dust concentration calculated by analytical model presented in Appendix E.
Intake Formula:	$\text{Intake} = \frac{CA \times IR \times EF \times ED}{BW \times AT}$ (Equation A)
	$CA = CD \times CS \times CF$ (Equation B)
Parameter Definitions and Units:	
(Equation A):	Intake in (mg/kg–day) CA = Contaminant concentration in air (mg/m3) IR = Inhalation rate (m3/day) EF = Exposure frequency (days/year) ED = Exposure duration (years) BW = Body weight (kg) AT = Averaging time (days)
(Equation B):	CD = Concentration of dust in air at exposure point (see Appendix E; mg dust/m3) CS = Contaminant concentration in soil (mg/kg) CF = Conversion factor (1E–06 kg/mg)
Assumptions:	
Residential:	IR = 20 m3/day (USEPA, 1991b) EF = 350 days/yr (USEPA, 1991b) ED = 30 years (USEPA, 1991b) BW = 70 kg (adult; USEPA, 1991b) AT = 70 years x 365 days/yr = 25,550 days, carcinogens (USEPA, 1991b) = 30 years x 365 days/yr = 10,950 days, noncarcinogens (USEPA, 1991b)
Light Industrial:	IR = 20 m3/workday (USEPA, 1991b) EF = 250 days/yr (USEPA, 1991b) ED = 25 years (USEPA, 1991b) BW = 70 kg (adult; USEPA, 1991b) AT = 70 years x 365 days/yr = 25,550 days carcinogens (USEPA, 1991b) = 25 years x 365 days/yr = 9,125 days noncarcinogens (USEPA, 1991b)
Military Land Use:	IR = 20 m3/workday (USEPA, 1991b) EF = 250 days/yr (USEPA, 1991b) ED = 3 years (estimated duration of tour of duty) BW = 75 kg (USEPA, 1989a) AT = 70 years x 365 days/yr = 25,550 days carcinogens (USEPA, 1991b) = 3 years x 365 days/yr = 1,095 days noncarcinogens (USEPA, 1991b)
Construction Workers:	IR = 30 m3/workday (assuming 4 hrs moderate and 4 hrs heavy activity per workday; inhalation rates from USEPA, 1989a) EF = 167 days/yr (estimated as 2/3 of available workdays because of inclement weather, winter, etc.) ED = 2 years (estimated duration of construction project) BW = 70 kg (USEPA, 1991b) AT = 70 years x 365 days/yr = 25,550 days carcinogens (USEPA, 1991b) = 2 years x 365 days/yr = 730 days noncarcinogens (USEPA, 1991b)

TABLE 6–15*(cont'd)

Quantitative Summary of Exposure Pathway 3
Future Land Use Scenario

Farmers and Farm Workers:

IR = 35 m3/workday (assuming 6 hrs moderate and 4 hrs heavy activity per workday; inhalation rates from USEPA, 1989a)
EF = 30 days/yr (estimated number of days/yr working in contaminated area)
ED = 40 years (estimated duration of farmer's career)
BW = 70 kg (USEPA, 1991b)
AT = 70 years x 365 days/yr = 25,550 days carcinogens (USEPA, 1991b)
= 40 years x 365 days/yr = 14,600 days noncarcinogens (USEPA, 1991b)

Sample Calculation:

Residential:

(Equation A):

$$\text{Intake} = \frac{\text{CA} \times 20\ (\text{m3/day}) \times 350\ (\text{days/yr}) \times 30\ (\text{yrs})}{70\ (\text{kg}) \times 25{,}550\ (\text{or } 10{,}950)\ (\text{days})}$$

= CA (mg/m3) x 1.17E–01 (m3/kg–day) (carcinogens)
= CA (mg/m3) x 2.74E–01 (m3/kg–day) (noncarcinogens)

(Equation B):

CA (mg/m3) = CD (mg/m3) x CS (mg/kg) x 1E–06 (kg/mg)

TABLE 6-16*

Quantitative Summary of Exposure Pathway 5
Future Land Use Scenario

Description: Ingestion of contaminated drinking water.

Exposure Point Concentration: 95 percent upper confidence limit on the arithmetic mean chemical concentration.

Intake Formula:

$$\text{Intake} = \frac{CW \times IR \times EF \times ED}{BW \times AT}$$

Parameter Definitions and Units:

Intake in (mg/kg–day)
CW = Exposure point chemical concentration in water (mg/l)
IR = Ingestion rate (l/day)
EF = Exposure frequency (days/year)
ED = Exposure duration (years)
BW = Body weight (kg)
AT = Averaging time (days)

Assumptions:

Residential:

IR = 2 l/day (USEPA, 1991b)
EF = 350 days/year (USEPA, 1991b)
ED = 30 years (USEPA, 1991b)
BW = 70 kg (adult; USEPA, 1991b)
AT = 70 years x 365 days/year = 25,550 days for carcinogens (USEPA, 1991b)
= 30 years x 365 days/year = 10,950 days for noncarcinogens (USEPA, 1991b)

Light Industrial:

IR = 1 l/day (USEPA, 1991b)
EF = 250 days/year (USEPA, 1991b)
ED = 25 years (USEPA, 1991b)
BW = 70 kg (adult; USEPA, 1991b)
AT = 70 years x 365 days/year = 25,550 days for carcinogens (USEPA, 1991b)
= 25 years x 365 days/year = 9,125 days for noncarcinogens (USEPA, 1991b)

Military:

IR = 1 l/day (USEPA, 1991b)
EF = 250 days/year (USEPA, 1991b)
ED = 3 years (estimated duration of tour of duty)
BW = 75 kg (USEPA, 1989a)
AT = 70 years x 365 days/year = 25,550 days for carcinogens (USEPA, 1991b)
= 3 years x 365 days/year = 1,095 days for noncarcinogens (USEPA, 1991b)

Sample Calculation:

Residential:

$$\text{Intake} = \frac{CW\ (mg/l) \times 2\ (l/day) \times 350\ (days/year) \times 30\ (yrs)}{70\ (kg) \times 25{,}550\ (\text{or } 10{,}950)\ (days)}$$

= CW (mg/l) x 1.17E–02 (l–kg/day) (carcinogens)
= CW (mg/l) x 2.74E–02 (l–kg/day) (noncarcinogens)

TABLE 6-21 *

Uptake Factors for Inorganic Analytes Used in Quantitation of Exposure Pathways 10, 11, and 12 (a)

	Pathways 10 and 11		Pathway 11	Pathway 12
Analyte	UFsp and UFwp (unitless) (b)	UFpa and UFwa (day/kg)	UFpm and UFwm (day/liter)	UFsp and UFwp (c) (unitless)
Arsenic	4.0E-03	2.0E-03	6.2E-05	4.0E-03
Beryllium	1.0E-03	1.0E-03	9.1E-07	1.0E-03
Cadmium	6.0E-02	3.5E-04	1.0E-03	6.0E-02
Chromium	8.0E-04	9.2E-03	1.0E-05	1.0E-03
Lead	5.0E-03	4.0E-04	2.6E-04	5.0E-03
Mercury	9.0E-02	2.7E-02	4.7E-04	9.0E-02
Nickel	6.0E-03	2.0E-03	1.0E-03	5.0E-02

(a) Source—Clement Associates, 1988.
(b) Values for leafy crops.
(c) The most conservative values for either leafy, root, or vine crops selected.
UFsp - Soil-to-plant uptake factor
UFwp - Water-to-plant uptake factor
UFpa - Plant-to-animal transfer coefficient
UFwa - Water-to-animal transfer coefficient
UFpm - Plant-to-milk transfer coefficient
UFwm - Water-to-milk transfer coefficient

TABLE 6–23*

Quantitative Summary of Exposure Pathway 12
Future Land Use Scenario

Description: Consumption of crops irrigated by contaminated groundwater and/or grown in contaminated soil.

Exposure Point Concentration: Determined using Equations B and F below, using the 95 percent upper confidence limit on the arithmentic mean chemical concentration.

Intake Formula:

$$\text{Intake} = \frac{CC \times IR \times EF \times ED}{BW \times AT} \quad \text{(Equation A)}$$

Formulas Utilized:

For organics:

$CC = (CS \times Ksp) + (CW \times Kwp \times CF)$ (Equation B)

$Ksp = \text{antilog}(1.588-(0.578 \log Kow))$ (Travis and Arms, 1988) (Equation C)

$Kwp = Ksp \times Kd$ (Equation D)

$Kd = \text{antilog}(-0.99+(0.53 \log Kow)$ (Travis et al., 1986) (Equation E)

For inorganics:

$CC = (CS \times UFsp) + (CW \times UFwp \times CF)$ (Equation F)

Parameter Definitions and Units:

(Equation A):

Intake in (mg/kg–day)
CC = Contaminant Concentration in Crop (mg/kg)
IR = Ingestion rate of homegrown vegetables (kg/day)
EF = Exposure frequency (days/year)
ED = Exposure duration (years)
BW = Body weight (kg)
AT = Averaging time (days)

(Equation B):

CS = Contaminant concentration in surface soil (mg/kg)
CW = Contaminant concentration in water (mg/l)
Ksp = Partition coefficient between soil and plants (see Equation C; unitless)
Kwp = Partition coefficient between water and plants (see Equation D; unitless)
CF = 1l/kg

(Equation C):

Kow = Octanol/water partition coefficient (unitless)

(Equation D):

Kd = Soil–water partition coefficient (mg/kg in soil per mg/l in water)

(Equation F):

UFsp = Fresh weight plant uptake factor (unitless)
UFwp = Water–to–plant uptake factor (unitless)

Assumptions:

Residential:

(Equation A):

IR = 80 g/day or 0.080 kg/day for homegrown vegetables (USEPA, 1991a)
EF = 350 days/yr (USEPA, 1991a)
ED = 30 years (USEPA, 1991a)
BW = 70 kg (USEPA, 1991b)
AT = 70 years x 365 days/yr = 25,550 days for carcinogens (USEPA, 1991b)
= 30 years x 365 days/yr = 10,950 days for noncarcinogens (USEPA, 1991b)

(Equation C):

Kow = Chemical specific (see text)

(Equation F):

UFsp = Chemical specific (see text)
UFwp = Chemical specific (see text)

TABLE 6-23 *(cont'd)

Quantitative Summary of Exposure Pathway 12
Future Land Use Scenario

Sample Calculation:
2,4,6-TNT:

(Equation C):	Ksp = antilog(1.588-(0.578 log 100)) = 2.7
(Equation E):	Kd = antilog(-0.99+(0.53 log 100)) = 1.17
(Equation D):	Kwp = 2.7 x 1.17 = 3.16
(Equation B):	CC = (CS x 2.7) + (CW x 3.16)
(Equation A):	Intake = $\frac{\text{CC (mg/kg) x 0.08 (kg/day) x 350 (days/year) x 30 (years)}}{\text{70 (kg) x 25,550 (or 10,950)(days)}}$

= CC (mg/kg) x 4.7E-04 (1/day) (carcinogens)
= CC (mg/kg) x 1.1E-03 (1/day) (noncarcinogens)

6.5* ESTIMATED HUMAN EXPOSURE CONCENTRATIONS AND CONTAMINANT INTAKES

Quantitative estimates of human exposure point concentrations and contaminant intakes calculated according to the methodology presented in Section 6.4 of the Baseline RA are presented below for both the current and future land use scenarios. As discussed in Section 5.0*, exposure to lead is assessed using the UBK model--not the traditional risk assessment approach. This model and its application to UMDA sites are discussed in detail in Section 7.0 of the Baseline RA. Therefore, the noncarcinogenic intakes presented for lead in the following tables are for comparative purposes only and are not used to characterize the potential lead hazard at followup fieldwork sites.

6.5.1* Current Land Use Scenario

6.5.1.1* Worker Near Explosives Washout Area. Table 6-24* presents estimated exposure point concentrations and carcinogenic and noncarcinogenic intakes for the worker near the explosives washout area via inhalation of contaminated soil as airborne dust (pathway 3), the only pathway quantitatively evaluated for this receptor. Concentrations of contaminants of concern in airborne dust from each of the 19 relevant sites--Sites 4, 9, 16, 21, 31, 38, 39, 52, 57 (Locations II and III), 60, and 67, and followup fieldwork Sites 5, 15, 18, 19, 26, 36, and 47--are calculated according to Equation B provided in Table 6-14 of the Baseline RA, using the 95 percent UCL on the arithmetic mean of surface soil data (to a depth of 2 feet). These soil concentrations are obtained from occurrence and distribution tables presented in Section 3.0*. The site-specific airborne dust contaminant concentrations are then summed across the 19 sites to obtain the exposure point concentrations for the worker near the explosives washout area.

6.5.1.2* Open Detonation Pit Workers. Table 6-25* presents estimated exposure point concentrations and carcinogenic and noncarcinogenic intakes for the open detonation (OD) pit workers via inhalation of contaminated soil as airborne dust (pathway 3), the only pathway quantitatively evaluated for these receptors.

TABLE 6-24*

Estimated Contaminant Concentrations in Air and Estimated Human Intakes Due to Inhalation of Dust
Current Land Use Scenario, Worker Near Explosives Washout Area

Analyte	Concentrations in Air (mg/m3) (a)										
	Site 52	Site 18**	Site 57 II	Site 57 III	Site 21	Site 16	Site 38	Site 31	Site 60	Site 19**	Site 26**
Airborne Dust	5.74E-04	9.94E-06	8.44E-06	9.06E-05	7.51E-05	2.67E-03	4.35E-05	3.87E-05	3.22E-05	2.26E-05	1.54E-05
Aluminum	xx	1.80E-07	xx	xx	xx	xx	xx	xx	xx	2.86E-07	xx
Antimony	xx	xx	xx	xx	xx	xx	xx	xx	xx	2.01E-08	xx
Arsenic	xx	4.79E-11	xx	3.39E-10	xx	xx	xx	xx	xx	1.59E-09	xx
Barium	xx	3.07E-09	xx	xx	xx	1.14E-06	xx	1.22E-08	xx	1.83E-07	xx
Beryllium	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx
Cadmium	xx	xx	xx	5.27E-10	xx	8.84E-09	1.00E-10	xx	xx	4.14E-09	xx
Calcium	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx
Chromium	xx	4.47E-10	xx	xx	xx	xx	xx	xx	xx	4.98E-10	xx
Cobalt	xx	xx	xx	xx	xx	5.08E-08	xx	xx	xx	xx	xx
Copper	7.06E-08	6.43E-10	1.07E-09 (c)	1.64E-08	xx	3.15E-07	1.86E-07	xx	xx	7.17E-07	xx
Cyanide	xx	xx	xx	xx	xx	3.05E-09	xx	xx	xx	xx	xx
Iron	xx	xx	xx	xx	xx	xx	1.23E-06	2.14E-06	xx	xx	xx
Lead	9.01E-09	2.49E-09	1.43E-09 (c)	1.35E-08	xx	xx	3.35E-10	1.51E-09	3.67E-10 (c)	2.77E-08	7.22E-09
Magnesium	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx
Manganese	xx	1.04E-08	xx	xx	xx	xx	xx	xx	xx	xx	xx
Mercury	xx	xx	4.30E-11 (c)	5.25E-12	xx	xx	1.03E-11	xx	xx	2.01E-11	xx
Nickel	xx	1.98E-09	1.98E-10 (c)	xx	xx	xx	8.88E-10	xx	xx	5.32E-10	xx
Potassium	xx	xx	1.99E-08 (c)	1.88E-07	xx	xx	9.61E-08	1.08E-07	xx	6.00E-08	xx
Selenium	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx
Silver	xx	1.00E-11	3.87E-12 (c)	1.80E-08	xx	3.98E-09	2.44E-12	1.78E-11	1.54E-12 (c)	3.10E-11	1.35E-11
Sodium	xx	1.75E-08	xx	xx	xx	xx	xx	1.15E-06	xx	1.63E-08	xx
Thallium	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx
Zinc	7.81E-08	9.72E-09	3.29E-09 (c)	5.32E-07	xx	xx	1.20E-07	2.14E-08	xx	1.37E-06	2.90E-09
135TNB	xx	xx	xx	xx	xx	xx	xx	6.19E-10	xx	9.00E-10	xx
13DNB	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx
246TNT	xx	xx	xx	xx	xx	2.86E-09	1.66E-11	8.44E-08	xx	2.27E-07	xx
24DNT	xx	xx	xx	xx	xx	xx	xx	8.05E-11	xx	xx	xx
26DNT	xx	xx	xx	xx	xx	xx	xx	1.10E-11 (c)	xx	xx	xx
HMX	3.34E-10	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx
RDX	4.96E-10	xx	xx	xx	xx	3.53E-09	xx	1.19E-10	xx	xx	xx
Nitrobenzene	xx	xx	xx	xx	xx	xx	xx	xx	xx	7.31E-11 (c)	xx
Tetryl	xx	xx	1.70E-11 (c)	xx	xx	xx	xx	8.01E-11	xx	3.35E-11 (c)	xx
Nitrate/nitrite	xx	xx	xx	xx	1.12E-09	4.17E-08	xx	1.79E-09	xx	2.53E-10	xx
1,1,1-Trichloroethane	xx	6.96E-14	xx	xx	xx	xx	xx	xx	xx	xx	xx
Benzo(a)anthracene	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx
Benzo(b)fluoranthene	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx
Benzo(k)fluoranthene	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx
Chrysene	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx
Di-n-butyl phthalate	xx	1.46E-12	xx	xx	xx	xx	xx	xx	xx	xx	xx
Fluoranthene	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx
Napthalene	xx	xx	xx	xx	xx	xx	xx	1.97E-12 (c)	xx	xx	xx
Phenanthrene	xx	xx	xx	xx	xx	xx	xx	1.74E-11	xx	xx	xx
Pyrene	xx	4.67E-13	xx	xx	xx	xx	xx	xx	xx	xx	xx
Chlordane	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx
Dieldrin	xx	xx	xx	xx	xx	xx	xx	3.21E-12	xx	xx	xx
DDD	xx	xx	xx	xx	xx	xx	xx	3.21E-12	xx	xx	xx
DDE	xx	5.96E-14	xx	xx	xx	xx	xx	2.00E-11	xx	xx	xx
DDT	xx	6.96E-14	xx	xx	xx	xx	xx	1.64E-11	xx	xx	xx
PCB 1260	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx

TABLE 6-24*. (cont'd)

Estimated Contaminant Concentrations In Air and Estimated Human Intakes Due to Inhalation of Dust

Current Land Use Scenario, Worker Near Explosives Washout Area

Analyte	Concentrations In Air (mg/m3) (a) Site 39	Site 15**	Site 67	Site 4	Site 47**	Site 9	Site 5**	Site 36**	Exposure Point Concentration (mg/m3)(b)	Carcinogenic Intake (mg/kg/day)	Noncarcino-genic Intake (mg/kg/day)
Airborne Dust	1.14E-05	1.80E-06	2.40E-04	1.02E-04	3.67E-05	1.30E-05	2.52E-05	1.32E-05			
Aluminum	xx	xx	xx	xx	xx	xx	xx	xx	4.66E-07	–	9.12E-08
Antimony	3.10E-11	1.70E-09	xx	xx	5.54E-09	1.77E-10	xx	xx	2.76E-08	–	5.40E-09
Arsenic	xx	1.62E-11	xx	xx	xx	xx	xx	xx	1.99E-09	1.39E-10	3.90E-10
Barium	xx	4.20E-09	xx	xx	1.72E-08	xx	xx	xx	1.36E-06	–	2.66E-07
Beryllium	xx	8.14E-12	xx	xx	xx	xx	xx	xx	8.14E-12	5.69E-13	1.59E-12
Cadmium	xx	1.47E-09	xx	xx	8.54E-10	5.48E-11	xx	2.85E-09	1.88E-08	1.32E-09	3.69E-09
Calcium	xx	xx	xx	xx	2.68E-06	xx	xx	xx	2.68E-06	–	5.25E-07
Chromium	xx	3.68E-09	xx	xx	1.47E-09	2.88E-10	xx	8.31E-10	7.21E-09	5.04E-10	1.41E-09
Cobalt	xx	1.41E-10	xx	xx	xx	xx	xx	1.52E-10	5.10E-08	–	9.99E-09
Copper	3.53E-09	1.86E-09	xx	xx	9.68E-09	xx	xx	6.74E-10	1.32E-06	–	2.59E-07
Cyanide	xx	xx	xx	xx	xx	xx	xx	xx	3.05E-09	–	5.96E-10
Iron	xx	9.75E-08	xx	xx	xx	xx	xx	2.93E-07	3.77E-06	–	7.38E-07
Lead	3.29E-09	7.22E-10	1.03E-08 (c)	xx	1.57E-08	1.01E-09	xx	1.83E-09	9.64E-08	–	1.89E-08
Magnesium	xx	1.47E-08	xx	xx	5.85E-07	xx	xx	xx	5.99E-07	–	1.17E-07
Manganese	xx	1.56E-09	xx	xx	xx	xx	xx	xx	1.20E-08	–	2.34E-09
Mercury	xx	1.33E-13	xx	xx	2.05E-11	xx	xx	xx	9.94E-11	–	1.94E-11
Nickel	xx	1.84E-10	xx	xx	1.73E-09	xx	xx	2.33E-10	5.74E-09	4.01E-10	1.12E-09
Potassium	xx	3.61E-09	xx	xx	xx	xx	xx	xx	4.76E-07	–	9.31E-08
Selenium	xx	3.01E-12	xx	xx	9.57E-12	xx	xx	xx	1.26E-11	–	2.46E-12
Silver	1.02E-11	1.22E-12	xx	xx	2.34E-11	6.90E-13	xx	4.15E-12	2.21E-08	–	4.33E-09
Sodium	xx	1.55E-09	xx	xx	3.40E-08	xx	xx	xx	1.22E-06	–	2.39E-07
Thallium	xx	3.85E-10	xx	xx	xx	xx	xx	xx	3.85E-10	–	7.54E-11
Zinc	5.80E-10	1.35E-08	xx	xx	3.52E-08	2.98E-09	xx	9.33E-09	2.19E-06	–	4.29E-07
135TNB	xx	5.27E-12	xx	1.31E-09	xx	xx	1.43E-10	xx	2.98E-09	–	5.84E-10
13DNB	xx	xx	xx	xx	xx	xx	7.62E-12	xx	7.62E-12	–	1.49E-12
246TNT	xx	1.71E-10	xx	9.19E-08	xx	xx	1.91E-08	xx	4.25E-07	2.97E-08	8.32E-08
24DNT	xx	2.70E-12	xx	3.29E-10	xx	xx	2.08E-11	xx	4.33E-10	3.03E-11	8.47E-11
26DNT	xx	2.02E-13	xx	xx	xx	xx	xx	xx	1.12E-11	7.85E-13	2.20E-12
HMX	xx	2.00E-11	xx	2.44E-09	xx	1.86E-11	4.44E-10	xx	3.26E-09	–	6.38E-10
RDX	xx	8.64E-11	xx	2.51E-08	xx	8.98E-12	4.16E-09	xx	3.35E-08	2.34E-09	6.55E-09
Nitrobenzene	xx	xx	xx	xx	xx	xx	xx	xx	7.31E-11	–	1.43E-11
Tetryl	xx	xx	xx	xx	xx	xx	8.56E-11	xx	2.16E-10	–	4.23E-11
Nitrate/nitrite	xx	1.46E-10 (c)	xx	7.42E-10	6.82E-10	xx	2.09E-10	1.08E-10	4.67E-08	–	9.14E-09
1,1,1-Trichloroethane	xx	xx	xx	xx	xx	xx	xx	xx	6.96E-14	–	1.36E-14
Benzo(a)anthracene	xx	xx	xx	xx	9.13E-12 (c)	xx	xx	xx	9.13E-12	6.38E-13	1.79E-12
Benzo(b)fluoranthene	xx	xx	xx	xx	1.65E-11 (c)	xx	xx	xx	1.65E-11	1.15E-12	3.22E-12
Benzo(k)fluoranthene	xx	xx	xx	xx	8.43E-12 (c)	xx	xx	xx	8.43E-12	5.89E-13	1.65E-12
Chrysene	xx	xx	xx	xx	1.76E-11 (c)	xx	xx	xx	1.76E-11	1.23E-12	3.45E-12
Di-n-butyl phthalate	xx	xx	xx	xx	2.98E-11	xx	xx	xx	3.13E-11	–	6.12E-12
Fluoranthene	xx	xx	xx	xx	1.08E-11 (c)	xx	xx	xx	1.08E-11	–	2.11E-12
Napthalene	xx	xx	xx	xx	xx	xx	xx	xx	1.97E-12	–	3.86E-13
Phenanthrene	xx	xx	xx	xx	3.41E-12 (c)	xx	xx	xx	2.08E-11	–	4.08E-12
Pyrene	xx	xx	xx	xx	1.19E-11 (c)	xx	xx	xx	1.24E-11	–	2.42E-12
Chlordane	xx	xx	xx	xx	1.11E-11	xx	xx	xx	1.11E-11	7.76E-13	2.17E-12
Dieldrin	xx	xx	xx	xx	2.57E-13	xx	xx	xx	3.47E-12	2.42E-13	6.79E-13
DDD	xx	xx	xx	xx	6.45E-12	xx	xx	xx	9.66E-12	6.75E-13	1.89E-12
DDE	xx	xx	xx	xx	2.57E-13	xx	xx	xx	2.04E-11	1.42E-12	3.98E-12
DDT	xx	xx	xx	xx	2.46E-12	xx	xx	xx	1.89E-11	1.32E-12	3.70E-12
PCB 1260	xx	xx	xx	xx	1.23E-11	xx	xx	xx	1.23E-11	8.61E-13	2.41E-12

(a) - Concentration in air = Conc. in soil (mg/kg) x airborne dust conc (mg/m3) x 1E-06 (kg/mg). Unless otherwise noted, the soil concentration is the 95 percent upper confidence limit on the arithmetic mean of surface soil data (samples less than 2 feet deep). Non-detects are replaced with one-half the detection level for calculating the soil concentration. Airborne dust concentrations were taken from Appendix E.

(b) - The exposure point concentration is the sum of site-specific airborne contaminant concentrations. The assumption is made that the contaminants are distributed in the air in the same proportion as they are in the surface soil.

(c) - The soil concentration used to calculate the concentration in air is the maximum detected or the only detected concentration in surface soil.

"–" - Not calculated because contaminant is not considered a carcinogen or potency factor is not available.

"xx" - Not calculated since chemical was not identified as a contaminant of concern at this site.

* - Replaces original Table 6-24* in the final Baseline RA; Dames & Moore, 1992a.

** - Site at which followup fieldwork was conducted

TABLE 6-25*

Estimated Contaminant Concentrations in Air and Estimated Human Intakes Due to Inhalation of Dust Current Land Use Scenario, Open Detonation Pit Workers

Analyte	Concentration in Air (mg/m3) (a)			Exposure Point Concentration (mg/m3)(b)	Carcinogenic Intake (mg/kg/day)	Noncarcino-genic Intake (mg/kg/day)
	Site 16	Site 19**	Site 15**			
Airborne Dust	6.70E-01	3.66E-05	2.09E-06			
Aluminum	xx	4.62E-07	xx	4.62E-07	--	3.17E-08
Antimony	xx	3.25E-08	1.98E-09	3.45E-08	--	2.36E-09
Arsenic	xx	2.57E-09	1.88E-11	2.59E-09	3.80E-11	1.77E-10
Barium	2.86E-04	2.96E-07	4.88E-09	2.86E-04	--	1.96E-05
Beryllium	xx	xx	9.45E-12	9.45E-12	1.39E-13	6.47E-13
Cadmium	2.22E-06	6.69E-09	1.71E-09	2.23E-06	3.27E-08	1.52E-07
Chromium	xx	8.05E-10	4.27E-09	5.07E-09	7.44E-11	3.47E-10
Cobalt	1.27E-05	xx	1.64E-10	1.27E-05	--	8.72E-07
Copper	7.90E-05	1.16E-06	2.16E-09	8.02E-05	--	5.49E-06
Cyanide	7.64E-07	xx	xx	7.64E-07	--	5.23E-08
Iron	xx	xx	1.13E-07	1.13E-07	--	7.75E-09
Lead	xx	4.48E-08	8.38E-10	4.56E-08	--	3.13E-09
Magnesium	xx	xx	1.70E-08	1.70E-08	--	1.17E-09
Manganese	xx	xx	1.81E-09	1.81E-09	--	1.24E-10
Mercury	xx	3.25E-11	1.55E-13	3.27E-11	--	2.24E-12
Nickel	xx	8.59E-10	2.13E-10	1.07E-09	1.57E-11	7.35E-11
Potassium	xx	9.70E-08	4.19E-09	1.01E-07	--	6.93E-09
Selenium	xx	xx	3.49E-12	3.49E-12	--	2.39E-13
Silver	9.98E-07	5.01E-11	1.41E-12	9.98E-07	--	6.84E-08
Sodium	xx	2.64E-08	1.80E-09	2.82E-08	--	1.93E-09
Thallium	xx	xx	4.47E-10	4.47E-10	--	3.06E-11
Zinc	xx	2.21E-06	1.56E-08	2.22E-06	--	1.52E-07
135TNB	xx	1.46E-09	6.12E-12	1.46E-09	--	1.00E-10
246TNT	7.17E-07	3.66E-07	1.99E-10	1.08E-06	1.59E-08	7.42E-08
HMX	xx	xx	2.32E-11	2.32E-11	--	1.59E-12
RDX	8.84E-07	xx	1.00E-10	8.84E-07	1.30E-08	6.06E-08
24DNT	xx	xx	3.14E-12	3.14E-12	4.60E-14	2.15E-13
26DNT	xx	xx	2.34E-13	2.34E-13	3.44E-15	1.60E-14
Nitrobenzene	xx	1.18E-10 (c)	xx	1.18E-10	--	8.09E-12
Tetryl	xx	5.41E-11 (c)	xx	5.41E-11	--	3.71E-12
Nitrate/nitrite	1.04E-05	4.10E-10	1.69E-10 (c)	1.05E-05	--	7.16E-07

(a) - Concentration in air = Conc. in soil (mg/kg) x airborne dust conc (mg/m3) x 1E-06 (kg/mg). Soil concentration is the 95 percent upper confidence limit on the arithmetic mean of surface soil data (samples less than 2 feet deep). Non-detects are replaced with one-half the detection level for calculating the soil concentration. Airborne dust concentration were taken from Appendix E.

(b) - The exposure point concentration is the sum of site-specific airborne contaminant concentrations. The assumption is made that the contaminants are distributed in the air in the same proportion as they are in the surface soil.

(c) - The soil concentration used to calculate the concentration in air is the maximum detected concentration, which is less than the 95 percent upper confidence limit on the arithmetic mean.

"--" - Not calculated because contaminant is not considered a carcinogen or potency factor is not available.

"xx" - Not calculated since chemical was not identified as a contaminant of concern at this site.

* - Replaces original Table 6-25 in the Final Baseline RA; Dames & Moore, 1992a.

** - Site at which followup fieldwork was conducted

Concentrations of contaminants of concern in airborne dust from each of the three relevant sites--Site 16 and followup fieldwork Sites 15 and 19--are calculated according to Equation B provided in Table 6-14 of the Baseline RA, using the 95 percent UCL on the arithmetic mean of surface soil data (to a depth of 2 feet). These soil concentrations are obtained from occurrence and distribution tables presented in Section 3.0*. The site-specific airborne dust contaminant concentrations are then summed across the three sites to obtain the exposure point concentrations for the OD pit workers.

6.5.1.3* Open Burning Tray Workers. Table 6-26* presents estimated exposure point concentrations and carcinogenic and noncarcinogenic intakes for the open burning tray workers via inhalation of contaminated soil as airborne dust (pathway 3), the only pathway quantitatively evaluated for these receptors. Concentrations of contaminants of concern in airborne dust from each of the six relevant sites--Sites 16, 32 (Location I), and 57 (Locations I and II), and followup fieldwork Sites 15 and 19--are calculated according to Equation B provided in Table 6-14 of the Baseline RA, using the 95 percent UCL on the arithmetic mean of surface soil data (to a depth of 2 feet). These soil concentrations are obtained from occurrence and distribution tables presented in Section 3.0*. The site-specific airborne dust contaminant concentrations are then summed across the six sites to obtain the exposure point concentrations for the open burning tray workers.

6.5.1.4* Target Range Users. Table 6-27 of the Baseline RA, which presents estimated exposure point concentrations and carcinogenic and noncarcinogenic intakes for the target range users at Site 60 via incidental ingestion of soil (pathway 2), is not affected by the followup fieldwork investigations and, therefore, is not presented in this addendum.

Table 6-28* presents estimated exposure point concentrations and carcinogenic and noncarcinogenic intakes for the target range users at Sites 16, 57 (Location III), and 60, and followup fieldwork Site 15, via inhalation of contaminated soil as airborne dust (pathway 3). Concentrations of contaminants of concern in airborne dust from

TABLE 6-26*

Estimated Contaminant Concentrations in Air and Estimated Human Intakes Due to Inhalation of Dust
Current Land Use Scenario, Open Burning Tray Workers

Analyte	Concentration in Air (mg/m3) (a)						Exposure Point Concentration	Carcinogenic Intake	Noncarcinogenic Intake
	Site 57 II	Site 16	Site 57 I	Site 19**	Site 15**	Site 32 I	(mg/m3)(b)	(mg/kg/day)	(mg/kg/day)
Airborne Dust	4.16E-04	9.84E-02	4.40E-04	2.52E-03	1.09E-04	4.20E-04			
Aluminum	xx	xx	xx	3.18E-05	xx	3.29E-06	3.51E-05	--	1.72E-06
Antimony	xx	xx	xx	2.24E-06	1.03E-07	6.42E-09	2.35E-06	--	1.15E-07
Arsenic	xx	xx	xx	1.77E-07	9.83E-10	xx	1.78E-07	1.86E-09	8.69E-09
Barium	xx	4.20E-05	xx	2.04E-05	2.55E-07	4.52E-06	6.72E-05	--	3.29E-06
Beryllium	xx	xx	xx	xx	4.93E-10	xx	4.93E-10	5.17E-12	2.41E-11
Cadmium	xx	3.26E-07	xx	4.61E-07	8.91E-08	xx	8.75E-07	9.18E-09	4.28E-08
Chromium	xx	xx	xx	5.54E-08	2.23E-07	xx	2.78E-07	2.92E-09	1.36E-08
Cobalt	xx	1.87E-06	xx	xx	8.54E-09	xx	1.88E-06	--	9.19E-08
Copper	5.29E-08 (c)	1.16E-05	xx	7.98E-05	1.13E-07	1.02E-06	9.26E-05	--	4.53E-06
Cyanide	xx	1.12E-07	xx	xx	xx	xx	1.12E-07	--	5.49E-09
Iron	xx	xx	xx	xx	5.91E-06	xx	5.91E-06	--	2.89E-07
Lead	7.09E-08 (c)	xx	2.01E-08 (d)	3.08E-06	4.37E-06	2.99E-07	1.05E-05	--	5.15E-07
Magnesium	xx	xx	xx	xx	8.88E-07	4.65E-06	5.54E-06	--	2.71E-07
Manganese	xx	xx	xx	xx	9.45E-08	xx	9.45E-08	--	4.62E-09
Mercury	2.12E-09 (c)	xx	6.03E-11 (d)	2.24E-09	8.07E-12	xx	4.43E-09	--	2.17E-10
Nickel	9.78E-09 (c)	xx	xx	5.92E-08	1.11E-08	xx	8.01E-08	8.39E-10	3.92E-09
Potassium	9.83E-07 (c)	xx	9.86E-07 (d)	6.68E-06	2.19E-07	1.40E-06	1.03E-05	--	5.02E-07
Selenium	xx	xx	xx	xx	1.82E-10	xx	1.82E-10	--	8.91E-12
Silver	1.91E-10 (c)	1.47E-07	xx	3.45E-09	7.38E-11	6.04E-11	1.50E-07	--	7.36E-09
Sodium	xx	xx	xx	1.82E-06	9.39E-08	xx	1.91E-06	--	9.35E-08
Thallium	xx	xx	xx	xx	2.33E-08	xx	2.33E-08	--	1.14E-09
Zinc	1.62E-07 (c)	xx	7.17E-08 (d)	1.52E-04	8.16E-07	3.08E-07	1.53E-04	--	7.50E-06
135TNB	xx	xx	xx	1.00E-07	3.20E-10	xx	1.00E-07	--	4.92E-09
246TNT	xx	1.05E-07	xx	2.52E-05	1.04E-08	xx	2.53E-05	2.66E-07	1.24E-06
24DNT	xx	xx	xx	xx	1.64E-10	4.87E-10	6.51E-10	6.82E-12	3.18E-11
HMX	xx	xx	xx	xx	1.21E-09	xx	1.21E-09	--	5.92E-11
RDX	xx	1.30E-07	xx	xx	5.24E-09	xx	1.35E-07	1.42E-09	6.61E-09
26DNT	xx	xx	xx	xx	1.22E-11	xx	1.22E-11	1.28E-13	5.98E-13
Nitrobenzene	xx	xx	xx	8.13E-09 (c)	xx	xx	8.13E-09	--	3.98E-10
Tetryl	8.41E-10 (c)	xx	xx	3.73E-09 (c)	xx	xx	4.57E-09	--	2.23E-10
Nitrate/nitrite	xx	1.53E-06	xx	2.82E-08	8.84E-09 (c)	9.19E-09	1.58E-06	--	7.73E-08

(a) - Concentration in air = Conc. in soil (mg/kg) x airborne dust conc (mg/m3) x 1E-06 (mg/kg). Unless otherwise noted, the soil concentration is the 95 percent upper confidence limit on the arithmetic mean of surface soil data (samples less than 2 feet deep). Non-detects are replaced with one-half the detection level for calculating the soil concentration. Airborne dust concentrations were taken from Appendix E.

(b) - The exposure point concentration is the sum of site-specific airborne contaminant concentrations. The assumption is made that the contaminants are distributed in the air in the same proportion as they are in the surface soil.

(c) - The soil concentration used to calculate the maximum concentration in air is the maxiumum detected concentration, which is less than the 95 percent upper confidence limit on the arithmetic mean.

(d) - The soil concentration used to calculate the maximum concentration in air is the only detected concentration in surface soil.

"--" - Not calculated because contaminant is not considered a carcinogen or potency factor is not available.

"xx" - Not calculated since chemical was not identified as a contaminant of concern at this site.

* - Replaces original Table 6-26 in the Final Baseline RA; Dames & Moore, 1992a.

** - Site at which followup fieldwork was conducted

TABLE 6-28*

Estimated Contaminant Concentrations In Air and Estimated Human Intakes Due to Inhalation of Dust Current Land Use Scenario, Target Range Users

Analyte	Concentrations in Air (mg/m3) (a) Site 57 III	Site 16	Site 60	Site 15**	Exposure Point Concentration (mg/m3)(b)	Carcinogenic Intake (mg/kg/day)	Noncarcino-genic Intake (mg/kg/day)
Airborne Dust	1.53E-04	1.78E-02	3.14E-03	1.16E-06			
Antimony	xx	xx	xx	1.10E-09	1.10E-09	–	1.29E-11
Arsenic	5.71E-10	xx	xx	1.05E-11	5.82E-10	8.78E-13	6.83E-12
Barium	xx	7.59E-06	xx	2.71E-09	7.60E-06	–	8.92E-08
Beryllium	xx	xx	xx	5.24E-12	5.24E-12	7.92E-15	6.16E-14
Cadmium	8.89E-10	5.89E-08	xx	9.48E-10	6.07E-08	9.16E-11	7.13E-10
Chromium	xx	xx	xx	2.37E-09	2.37E-09	3.58E-12	2.78E-11
Cobalt	xx	3.38E-07	xx	9.08E-11	3.38E-07	–	3.97E-09
Copper	2.76E-08	2.10E-06	xx	1.20E-09	2.13E-06	–	2.50E-08
Cyanide	xx	2.03E-08	xx	xx	2.03E-08	–	2.38E-10
Iron	xx	xx	xx	6.28E-08	6.28E-08	–	7.37E-10
Lead	2.28E-08	xx	3.58E-08 (c)	4.65E-10	5.90E-08	–	6.93E-10
Magnesium	xx	xx	xx	9.45E-09	9.45E-09	–	1.11E-10
Manganese	xx	xx	xx	1.00E-09	1.00E-09	–	1.18E-11
Mercury	8.86E-12	xx	xx	8.58E-14	8.94E-12	–	1.05E-13
Nickel	xx	xx	xx	1.18E-10	1.18E-10	1.79E-13	1.39E-12
Potassium	3.17E-07	xx	xx	2.32E-09	3.19E-07	–	3.74E-09
Selenium	xx	xx	xx	1.94E-12	1.94E-12	–	2.27E-14
Silver	3.04E-08	2.65E-08	1.51E-10 (c)	7.84E-13	5.70E-08	–	6.70E-10
Sodium	xx	xx	xx	9.99E-10	9.99E-10	–	1.17E-11
Thallium	xx	xx	xx	2.48E-10	2.48E-10	–	2.91E-12
Zinc	8.96E-07	xx	xx	8.68E-09	9.05E-07	–	1.06E-08
135TNB	xx	xx	xx	3.40E-12	3.40E-12	–	3.99E-14
246TNT	xx	1.90E-08	xx	1.10E-10	1.91E-08	2.89E-11	2.25E-10
HMX	xx	xx	xx	1.29E-11	1.29E-11	–	1.51E-13
RDX	xx	2.35E-08	xx	5.57E-11	2.35E-08	3.55E-11	2.76E-10
24DNT	xx	xx	xx	1.74E-12	1.74E-12	2.63E-15	2.04E-14
26DNT	xx	xx	xx	1.30E-13	1.30E-13	1.96E-16	1.53E-15
Nitrate/nitrite	xx	2.77E-07	xx	9.40E-11 (c)	2.77E-07	–	3.26E-09

(a) - Concentration in air = Conc. in soil (mg/kg) x airborne dust conc (mg/m3) x 1E-06 (kg/mg). Soil concentration is the 95 Percent upper confidence limit on the arithmetic mean of surface soil data (samples less than 2 feet deep). Non-detects are replace with one-half the detection level for calculating the soil concentration. Airborne dust concentration were taken from Appendix E.

(b) - The exposure point concentration is the sum of site-specific airborne contaminant concentrations. The assumption is made that the contaminants are distributed in the air in the same proportion as they are in the surface soil.

(c) - The soil concentration used to calculate the concentration in air is the maximum detected concentration, which is less than the 95 percent upper confidence limit on the arithmetic mean.

"–" - Not calculated because contaminant is not considered a carcinogen or potency factor is not available.

"xx" - Not calculated since chemical was not identified as a contaminant of concern at this site.

* - Replaces original Table 6-28 in the Final Baseline RA; Dames & Moore, 1992a.

** - Site at which followup fieldwork was conducted

each of the four relevant sites are calculated according to Equation B provided in Table 6-14 of the Baseline RA, using the 95 percent UCL on the arithmetic mean of surface soil data (to a depth of 2 feet). These soil concentrations are obtained from occurrence and distribution tables presented in Section 3.0*. The site-specific airborne dust contaminant concentrations are then summed across the four sites to obtain the exposure point concentrations for the target range users.

6.5.1.5* Worker Near Southwest Warehouse Area. Tables 6-29 and 6-30 of the Baseline RA, which present estimated exposure point concentrations and intakes for the worker near the southwest warehouse area via incidental soil ingestion (pathway 2) at Sites 37 and 46, respectively, are not affected by the followup fieldwork.

Table 6-31* presents estimated exposure point concentrations and carcinogenic and noncarcinogenic intakes for the worker near the southwest warehouse area via inhalation of contaminated soil as airborne dust (pathway 3) from eight sites. Concentrations of contaminants of concern in airborne dust from each of the eight sites--Sites 1, 16, 21, 37, 46, and 57 (Location III), and followup fieldwork Sites 15 and 19--are calculated according to Equation B provided in Table 6-14 of the Baseline RA, using the 95 percent UCL on the arithmetic mean of surface soil data (to a depth of 2 feet). These soil concentrations are obtained from occurrence and distribution tables presented in Section 3.0*. The site-specific airborne dust contaminant concentrations are then summed across the eight sites to obtain the exposure point concentrations for the worker near the southwest warehouse area.

6.5.1.6* DRMO Employee. Tables 6-32* and 6-33* present estimated exposure point concentrations and carcinogenic and noncarcinogenic intakes for the DRMO employee via incidental soil ingestion (pathway 2) at followup fieldwork Site 22 and via inhalation of contaminated soil as airborne dust (pathway 3) from nine sites, respectively. The exposure point concentrations presented in Table 6-32* are the 95 percent UCL on the arithmetic mean of surface soil data (to a depth of 2 feet), obtained from Table 3-84* (Site 22). Concentrations of contaminants of concern in airborne dust from each of the nine relevant sites--Sites 16, 21, 27, 31, 38, and 57

TABLE 6-31*

Estimated Contaminant Concentrations in Air and Estimated Human Intakes Due to Inhalation of Dust
Current Land Use Scenario, Worker in SW Warehouse Area

	Concentrations in Air (mg/m3) (a)										
Analyte	Site 67 III	Site 21	Site 18	Site 19**	Site 1	Site 37	Site 48	Site 15**	Exposure Point Concentration (mg/m3)(b)	Carcinogenic Intake (mg/kg/day)	Noncarcinogenic Intake (mg/kg/day)
Airborne Dust	2.02E-06	1.81E-06	6.93E-03	5.12E-08	3.72E-06	2.86E-06	1.82E-06	4.50E-07			
Aluminum	xx	xx	xx	6.47E-08	xx	xx	xx	xx	6.47E-08	--	1.27E-08
Antimony	xx	xx	xx	4.56E-09	2.90E-09	xx	xx	4.26E-10	7.89E-09	--	1.54E-09
Arsenic	7.54E-11	xx	xx	3.59E-10	9.59E-11	xx	xx	4.05E-12	5.35E-10	3.74E-11	1.06E-10
Barium	xx	xx	2.96E-08	4.15E-08	7.61E-09	8.65E-09	xx	1.05E-09	3.02E-08	--	6.90E-07
Beryllium	xx	xx	xx	xx	3.72E-11	xx	xx	2.03E-12	3.92E-11	2.74E-12	7.67E-12
Cadmium	1.17E-10	xx	2.29E-08	9.37E-10	1.86E-10	1.68E-10	xx	3.68E-10	2.47E-08	1.73E-09	4.83E-09
Chromium	xx	xx	xx	1.13E-10	xx	3.54E-09	xx	9.19E-10	4.67E-09	3.20E-10	8.96E-10
Cobalt	xx	xx	1.32E-07	xx	xx	xx	xx	3.62E-11	1.32E-07	--	2.58E-08
Copper	3.65E-09	xx	6.17E-07	1.62E-07	3.32E-07	xx	6.67E-09 (c)	4.66E-10	1.32E-08	--	2.69E-07
Cyanide	xx	xx	7.90E-09	xx	xx	xx	xx	xx	7.90E-09	--	1.65E-09
Iron	xx	xx	xx	xx	xx	xx	xx	2.44E-08	2.44E-08	--	4.77E-09
Lead	3.01E-09	xx	xx	6.27E-09	9.73E-08	1.01E-08	3.65E-09 (c)	1.80E-10	1.21E-07	--	2.36E-08
Magnesium	xx	xx	xx	xx	xx	xx	xx	3.66E-09	3.66E-09	--	7.17E-10
Manganese	xx	xx	xx	xx	xx	xx	xx	3.90E-10	3.90E-10	--	7.63E-11
Mercury	1.17E-12	xx	xx	4.55E-12	xx	9.34E-12	xx	3.33E-14	1.61E-11	--	2.96E-12
Nickel	xx	xx	xx	1.20E-10	3.04E-10	xx	xx	4.59E-11	4.70E-10	3.28E-11	9.20E-11
Potassium	4.18E-08	xx	xx	1.36E-08	6.67E-08	xx	xx	9.01E-10	1.13E-07	--	2.21E-08
Selenium	xx	xx	xx	xx	xx	xx	xx	7.62E-13	7.62E-13	--	1.47E-13
Silver	4.01E-09	xx	1.03E-08	7.01E-12	8.26E-12	xx	2.60E-12 (c)	3.04E-13	1.44E-08	--	2.81E-09
Sodium	xx	xx	xx	3.70E-09	xx	xx	xx	3.87E-10	4.08E-09	--	7.99E-10
Thallium	xx	xx	xx	xx	1.07E-09	xx	xx	9.63E-11	1.16E-09	--	2.28E-10
Zinc	1.18E-07	xx	xx	3.09E-07	1.58E-07	6.37E-09 (c)	9.13E-09 (c)	3.37E-09	6.06E-07	--	1.18E-07
135TNB	xx	xx	xx	2.04E-10	xx	xx	xx	1.32E-12	2.06E-10	--	4.01E-11
246TNT	xx	xx	7.41E-09	5.13E-08	xx	xx	xx	4.28E-11	5.88E-08	4.11E-09	1.15E-08
HMX	xx	xx	xx	xx	xx	xx	xx	6.00E-12	6.00E-12	--	9.77E-13
RDX	xx	xx	9.14E-09	xx	xx	xx	xx	2.16E-11	9.17E-09	6.41E-10	1.79E-09
24DNT	xx	xx	xx	xx	xx	xx	xx	6.75E-13	6.75E-13	4.72E-14	1.32E-13
26DNT	xx	xx	xx	xx	xx	xx	xx	6.04E-14	6.04E-14	3.62E-15	9.86E-15
Nitrobenzene	xx	xx	xx	1.65E-11 (c)	xx	xx	xx	xx	1.66E-11	--	3.24E-12
Tetryl	xx	xx	xx	7.58E-12 (c)	xx	xx	xx	xx	7.58E-12	--	1.48E-12
Nitrate/nitrite	xx	2.69E-10	1.08E-07	5.73E-11	xx	xx	xx	3.65E-11 (c)	1.08E-07	--	2.12E-08
Tetrachloroethylene	xx	xx	xx	xx	xx	1.43E-13	xx	xx	1.43E-13	9.98E-15	2.79E-14
Anthracene	xx	xx	xx	xx	xx	xx	5.54E-12 (c)	xx	5.54E-12	--	1.08E-12
bis(2-Ethylhexyl)phthalate	xx	xx	xx	xx	xx	8.23E-09	xx	xx	8.23E-09	5.75E-10	1.61E-09
Dibenzofuran	xx	xx	xx	xx	xx	xx	3.21E-11 (c)	xx	3.21E-11	2.25E-12	6.29E-12
Di-n-butylphthalate	xx	xx	xx	xx	xx	xx	7.23E-11 (c)	xx	7.23E-11	--	1.41E-11
Fluoranthene	xx	xx	xx	xx	xx	xx	2.23E-11 (c)	xx	2.23E-11	--	4.37E-12
2-Methylnapthalene	xx	xx	xx	xx	xx	xx	5.83E-11 (c)	xx	5.83E-11	4.07E-12	1.14E-11
Napthalene	xx	xx	xx	xx	xx	xx	1.01E-10 (c)	xx	1.01E-10	--	1.98E-11
N-nitrosodiphenylamine	xx	xx	xx	xx	xx	xx	4.56E-12 (c)	xx	4.56E-12	3.19E-13	8.92E-13
Phenanthrene	xx	xx	xx	xx	xx	xx	4.98E-11 (c)	xx	4.98E-11	--	9.74E-12
Pyrene	xx	xx	xx	xx	xx	xx	9.13E-12 (c)	xx	9.13E-12	--	1.79E-12

(a) - Concentration in air = conc. in soil (mg/kg) x airborne dust conc. (mg/m3) x 1E-06 (kg/mg). Soil concentration is the 95 percent upper confidence limit on the arithmetic mean of surface soil data (samples less than 2 feet deep). Non-detects are replaced with one-half the detection level for calculating the soil concentration. Airborne dust concentrations were taken from Appendix E.

(b) - The exposure point concentration is the sum of site-specific airborne contaminant concentrations. The assumption is made that the contaminants are distributed in the air in the same proportion as they are in the surface soil.

(c) - The soil concentration used to calculate the concentration in air is the maximum detected concentration in surface soil, which is less than the 95 percent upper confidence limit on the arithmetic mean.

"--" - Not calculated because contaminant is not considered a carcinogen or potency factor is not available.

"xx" - Not calculated since chemical was not identified as a contaminant of concern at this site.

* - Replaces original Table 6-31 in the Final Baseline RA; Dames & Moore, 1992a.

** - Site at which followup fieldwork was conducted

TABLE 6-32*

Estimated Contaminant Concentrations in Soil and Estimated Human Intakes Due to Incidental Ingestion of Soil at Site 22 Current Land Use Scenario for DRMO Worker

Analyte	Exposure Point Concentration (mg/kg)(a)	Carcinogenic Intake (mg/kg/day)	Noncarcinogenic Intake (mg/kg/day)
Antimony	32.8	–	8.02E-07
Barium	126	–	3.08E-06
Beryllium	0.999	3.49E-09	2.44E-08
Cadmium	10.2	–	2.50E-07
Copper	739	–	1.81E-05
Lead	979	–	2.39E-05
Mercury	0.171	–	4.18E-09
Potassium	1520	–	3.72E-05
Silver	0.157	–	3.84E-09
Thallium	18.1	–	4.43E-07
Zinc	534	–	1.31E-05
DDD	0.039	1.36E-10	9.54E-10
DDE	0.05	1.75E-10	1.22E-09
DDT	0.129	4.51E-10	3.16E-09

(a) - Exposure point concentration is the 95 percent upper confidence limit on the arithmetic mean of surface soil data (samples less than 2 feet deep). Non-detects are replaced with one-half the detection level for calculating exposure point concentrations.

"–" - Not calculated because contaminant is not considered a carcinogen or potency factor is not available.

* - Replaces original Table 6-32 in the Final Baseline RA; Dames & Moore, 1992a.

TABLE 6–33*

Estimated Contaminant Concentrations in Air and Estimated Human Intakes Due to Inhalation of Dust
Current Land Use Scenario, Worker Near DRMO Building

	Concentrations in Air (mg/m3) (a)											
Analyte	Site 57 III	Site 21	Site 16	Site 38	Site 19	Site 22	Site 15	Site 31	Site 27	Exposure Point Concentration (mg/m3) (b)	Carcinogenic Intake (mg/kg/day)	Noncarcino–genic Intake (mg/kg/day)
Airborne Dust	2.36E–05	1.86E–05	4.03E–03	1.87E–05	1.12E–05	1.39E–03	9.10E–07	1.30E–05	2.38E–05			
Aluminum	xx	xx	xx	xx	1.41E–07	xx	xx	xx	xx	1.41E–07	––	2.77E–08
Antimony	xx	xx	xx	xx	9.96E–09	4.57E–08	8.62E–10	xx	xx	5.65E–08	––	1.11E–08
Arsenic	8.84E–11	xx	xx	xx	7.86E–10	xx	8.20E–12	xx	xx	8.82E–10	2.47E–11	1.73E–10
Barium	xx	xx	1.72E–06	xx	9.06E–08	1.76E–07	2.12E–09	4.10E–09	xx	1.99E–06	––	3.90E–07
Beryllium	xx	xx	xx	xx	xx	xx	4.11E–12	xx	xx	4.11E–12	1.15E–13	8.05E–13
Cadmium	1.38E–10	xx	1.33E–08	4.29E–11	2.05E–09	1.42E–08	7.43E–10	xx	xx	3.05E–08	8.53E–10	5.97E–09
Chromium	xx	xx	xx	xx	2.46E–10	xx	1.86E–09	xx	xx	2.10E–09	5.88E–11	4.12E–10
Cobalt	xx	xx	7.65E–08	xx	xx	xx	7.13E–11	xx	xx	7.66E–08	––	1.50E–08
Copper	4.28E–09	xx	4.75E–07	7.97E–08	3.55E–07	1.03E–06	9.42E–10	xx	xx	1.94E–06	––	3.81E–07
Cyanide	xx	xx	4.59E–09	xx	xx	xx	xx	xx	xx	4.59E–09	––	8.98E–10
Iron	xx	xx	xx	5.29E–07	xx	xx	4.93E–08	7.21E–07	xx	1.30E–06	––	2.54E–07
Lead	3.52E–09	xx	xx	1.43E–10	1.37E–08	1.36E–06	3.65E–10	5.08E–10	1.01E–09 (c)	1.38E–06	––	2.71E–07
Magnesium	xx	xx	xx	xx	xx	xx	7.41E–09	xx	xx	7.41E–09	––	1.45E–09
Manganese	xx	xx	xx	xx	xx	xx	7.88E–10	xx	xx	7.88E–10	––	1.54E–10
Mercury	1.37E–12	xx	xx	4.42E–12	9.95E–12	2.38E–10	6.73E–14	xx	xx	2.54E–10	––	4.97E–11
Nickel	xx	xx	xx	3.81E–10	2.63E–10	xx	9.28E–11	xx	xx	7.36E–10	2.06E–11	1.44E–10
Potassium	4.90E–08	xx	xx	4.12E–08	2.97E–08	2.12E–06	1.82E–09	3.65E–08	xx	2.28E–06	––	4.46E–07
Selenium	xx	xx	xx	xx	xx	xx	1.52E–12	xx	xx	1.52E–12	––	2.97E–13
Silver	4.70E–09	xx	6.00E–09	1.04E–12	1.53E–11	2.19E–10	6.15E–13	6.00E–12	xx	1.09E–08	––	2.14E–09
Sodium	xx	xx	xx	xx	8.08E–09	xx	7.84E–10	3.87E–07	xx	3.96E–07	––	7.75E–08
Thallium	xx	xx	xx	xx	xx	xx	1.95E–10	xx	xx	1.95E–10	––	3.81E–11
Zinc	1.39E–07	xx	xx	5.14E–08	6.75E–07	7.44E–07	6.81E–09	7.21E–09	5.48E–09 (c)	1.63E–06	––	3.19E–07
135TNB	xx	xx	xx	xx	4.45E–10	xx	2.67E–12	2.08E–10	xx	6.56E–10	––	1.28E–10
246TNT	xx	xx	4.31E–09	7.11E–12	1.12E–07	xx	8.65E–11	2.84E–08	xx	1.45E–07	4.05E–09	2.84E–08
24DNT	xx	xx	xx	xx	xx	xx	1.37E–12	2.71E–11	xx	2.84E–11	7.95E–13	5.57E–12
26DNT	xx	xx	xx	xx	xx	xx	1.02E–13	3.71E–12 (c)	xx	3.81E–12	1.07E–13	7.46E–13
HMX	xx	xx	xx	xx	xx	xx	1.01E–11	xx	xx	1.01E–11	––	1.98E–12
RDX	xx	xx	5.31E–09	xx	xx	xx	4.37E–11	4.01E–11	xx	5.40E–09	1.51E–10	1.06E–09
Tetryl	xx	xx	xx	xx	1.66E–11 (c)	xx	xx	2.70E–11	xx	4.35E–11	––	8.52E–12
Nitrobenzene	xx	xx	xx	xx	3.61E–11 (c)	xx	xx	xx	xx	3.61E–11	––	7.07E–12
Nitrate/nitrite	xx	2.77E–10	6.28E–08	xx	1.25E–10	xx	7.37E–11 (c)	6.02E–10	xx	6.39E–08	––	1.25E–08
Naphthalene	xx	xx	xx	xx	xx	xx	xx	6.64E–13 (c)	xx	6.64E–13	––	1.30E–13
Fluoranthene	xx	xx	xx	xx	xx	xx	xx	xx	3.22E–12 (c)	3.22E–12	––	6.30E–13
Phenanthrene	xx	xx	xx	xx	xx	xx	xx	5.86E–12	1.05E–12 (c)	6.91E–12	––	1.35E–12
Pyrene	xx	xx	xx	xx	xx	xx	xx	xx	3.89E–12 (c)	3.89E–12	––	7.60E–13
DDD	xx	xx	xx	xx	xx	5.44E–11	xx	1.08E–12	xx	5.54E–11	1.55E–12	1.06E–11
DDE	xx	xx	xx	xx	xx	6.97E–11	xx	6.74E–12	xx	7.64E–11	2.14E–12	1.50E–11
DDT	xx	xx	xx	xx	xx	1.80E–10	xx	5.51E–12	3.34E–13 (c)	1.86E–10	5.19E–12	3.63E–11
Dieldrin	xx	xx	xx	xx	xx	xx	xx	1.08E–12	xx	1.08E–12	3.02E–14	2.11E–13

(a) – Concentration in air = conc. in soil (mg/kg) x airborne dust conc (mg/m3) x 1E–06 (kg/mg). Soil concentration is the 95 percent upper confidence limit on the arithmetic mean of surface soil data (samples less than 2 feet deep). Non–detects are replaced with one–half the detection level for calculating the soil concentration. Airborne dust concentrations were taken from Appendix E.
(b) – The exposure point concentration is the sum of site–specific airborne contaminant concentrations. The assumption is made that the contaminants are distributed in the air in the same proportion as they are in the surface soil.
(c) – The soil concentration used to calculate the concentration in air is the maximum detected concentration in surface soil, which is less than the 95 percent upper confidence limit on the arithmetic mean.
"––" – Not calculated because contaminant is not considered a carcinogen or potency factor is not available.
"xx" – Not calculated since chemical was not identified as a contaminant of concern at this site.
* – Replaces original Table 6–33 in the Final Baseline RA; Dames & Moore, 1992a.

(Location III), and followup fieldwork Sites 15, 19, and 22--are calculated according to Equation B provided in Table 6-14 of the Baseline RA, using the same 95 percent UCL on the arithmetic mean of surface soil data (to a depth of 2 feet). These soil concentrations are obtained from occurrence and distribution tables presented in Section 3.0*. The site-specific airborne dust contaminant concentrations are then summed across the nine sites to obtain the exposure point concentrations for the DRMO employee.

6.5.1.7* Pesticide Worker. Table 6-34* presents estimated exposure point concentrations and carcinogenic and noncarcinogenic intakes for the pesticide worker via inhalation of contaminated soil as airborne dust (pathway 3), the only pathway quantitatively evaluated for this receptor. Concentrations of contaminants of concern in airborne dust from each of the nine relevant sites--Sites 16, 21, 31, 38, 57 (Location III), and 60, and followup fieldwork Sites 15, 19, and 22--are calculated according to Equation B provided in Table 6-14 of the Baseline RA, using the 95 percent UCL on the arithmetic mean of surface soil data (to a depth of 2 feet). These soil concentrations are obtained from occurrence and distribution tables presented in Section 3.0*. The site-specific airborne dust contaminant concentrations are then summed across the nine sites to obtain the exposure point concentrations for the pesticide worker.

6.5.1.8* Workers at Building 612. Table 6-35* presents estimated exposure point concentrations and carcinogenic and noncarcinogenic intakes for the workers at Building 612 via inhalation of contaminated soil as airborne dust (pathway 3), the only pathway quantitatively evaluated for these receptors. Concentrations of contaminants of concern in airborne dust from each of the nine relevant sites--Sites 9, 16, 38, 45 (Building 612), and 57 (Locations I and II), and followup fieldwork Sites 15, 18, and 19--are calculated according to Equation B provided in Table 6-14 of the Baseline RA, using the 95 percent UCL on the arithmetic mean of surface soil data (to a depth of 2 feet). These soil concentrations are obtained from occurrence and distribution tables presented in Section 3.0*. The site-specific airborne dust contaminant

TABLE 6-34*

Estimated Contaminant Concentrations in Air and Estimated Human Intakes Due to Inhalation of Dust Current Land Use Scenario, Worker in Pesticide Building

Analyte	Concentrations in Air (mg/m3) (a)									Exposure Point Concentration (mg/m3)(b)	Carcinogenic Intake (mg/kg/day)	Noncarcinogenic Intake (mg/kg/day)
	Site 57 III	Site 21	Site 16	Site 38	Site 31	Site 60	Site 19**	Site 22**	Site 15**			
Airborne Dust	2.62E-05	2.04E-05	4.20E-03	1.97E-05	1.39E-05	9.43E-06	1.20E-05	6.59E-05	9.50E-07			
Aluminum	xx	xx	xx	xx	xx	xx	1.51E-07	xx	xx	1.51E-07	--	3.70E-10
Antimony	xx	xx	xx	xx	xx	xx	1.06E-08	2.16E-09	9.00E-10	1.37E-08	--	3.35E-11
Arsenic	9.78E-11	xx	xx	xx	xx	xx	8.39E-10	xx	8.56E-12	9.45E-10	8.26E-13	2.31E-12
Barium	xx	xx	1.79E-06	xx	4.39E-09	xx	9.68E-08	8.30E-09	2.22E-09	1.90E-06	--	4.66E-09
Beryllium	xx	xx	xx	xx	xx	xx	xx	6.58E-11	4.29E-12	7.01E-11	6.13E-14	1.72E-13
Cadmium	1.52E-10	xx	1.39E-08	4.54E-11	xx	xx	2.19E-09	6.72E-10	7.76E-10	1.77E-08	1.55E-11	4.34E-11
Chromium	xx	xx	xx	xx	xx	xx	2.63E-10	xx	1.94E-09	2.20E-09	1.92E-12	5.39E-12
Cobalt	xx	xx	7.97E-08	xx	xx	xx	xx	xx	7.44E-11	7.98E-08	--	1.95E-10
Copper	4.73E-09	xx	4.95E-07	8.43E-08	xx	xx	3.79E-07	4.87E-08	9.83E-10	1.01E-06	--	2.48E-09
Cyanide	xx	xx	4.78E-09	xx	xx	xx	xx	xx	xx	4.78E-09	--	1.17E-11
Iron	xx	xx	xx	5.60E-07	7.72E-07	xx	xx	xx	5.14E-08	1.38E-06	--	3.38E-09
Lead	3.90E-09	xx	xx	1.52E-10	5.43E-10	1.08E-10 (c)	1.46E-08	6.45E-08	3.81E-10	8.42E-08	--	2.06E-10
Magnesium	xx	xx	xx	xx	xx	xx	xx	xx	7.74E-09	7.74E-09	--	1.89E-11
Manganese	xx	xx	xx	xx	xx	xx	xx	xx	8.23E-10	8.23E-10	--	2.01E-12
Mercury	1.52E-12	xx	xx	4.68E-12	xx	xx	1.06E-11	1.13E-11	7.03E-14	2.82E-11	--	6.89E-14
Nickel	xx	xx	xx	4.03E-10	xx	xx	2.81E-10	xx	9.69E-11	7.80E-10	6.82E-13	1.91E-12
Potassium	5.42E-08	xx	xx	4.36E-08	3.90E-08	xx	3.17E-08	1.00E-07	1.90E-09	2.71E-07	--	6.62E-10
Selenium	xx	xx	xx	xx	xx	xx	xx	xx	1.59E-12	1.59E-12	--	3.88E-15
Silver	5.21E-09	xx	6.25E-09	1.11E-12	6.42E-12	4.53E-13 (c)	1.64E-11	1.03E-11	6.42E-13	1.15E-08	--	2.81E-11
Sodium	xx	xx	xx	xx	4.14E-07	xx	8.63E-09	xx	8.18E-10	4.24E-07	--	1.04E-09
Thallium	xx	xx	xx	xx	xx	xx	xx	1.19E-09	2.03E-10	1.40E-09	--	3.42E-12
Zinc	1.54E-07	xx	xx	5.43E-08	7.72E-09	xx	7.21E-07	3.52E-08	7.11E-09	9.79E-07	--	2.40E-09
135TNB	xx	xx	xx	xx	2.23E-10	xx	4.76E-10	xx	2.78E-12	7.01E-10	--	1.72E-12
246TNT	xx	xx	4.49E-09	7.52E-12	3.04E-08	xx	1.20E-07	xx	9.03E-11	1.55E-07	1.35E-10	3.78E-10
24DNT	xx	xx	xx	xx	2.90E-11	xx	xx	xx	1.43E-12	3.04E-11	2.66E-14	7.44E-14
26DNT	xx	xx	xx	xx	3.97E-12 (c)	xx	xx	xx	1.06E-13	4.08E-12	3.56E-15	9.97E-15
HMX	xx	xx	xx	xx	xx	xx	xx	xx	1.05E-11	1.05E-11	--	2.58E-14
RDX	xx	xx	5.54E-09	xx	4.29E-11	xx	xx	xx	4.56E-11	5.63E-09	4.92E-12	1.38E-11
Nitrobenzene	xx	xx	xx	xx	xx	xx	3.86E-11 (c)	xx	xx	3.86E-11	--	9.44E-14
Tetryl	xx	xx	xx	xx	2.88E-11	xx	1.77E-11 (c)	xx	xx	4.65E-11	--	1.14E-13
Nitrate/nitrite	xx	3.04E-10	6.55E-08	xx	8.44E-10	xx	1.34E-10	xx	7.70E-11 (c)	6.66E-08	--	1.63E-10
Napthalene	xx	xx	xx	xx	7.10E-13 (c)	xx	xx	xx	xx	7.10E-13	--	1.74E-15
Phenanthrene	xx	xx	xx	xx	6.27E-12	xx	xx	xx	xx	6.27E-12	--	1.53E-14
Dieldrin	xx	xx	xx	xx	1.16E-12	xx	xx	xx	xx	1.16E-12	1.01E-15	2.83E-15
DDD	xx	xx	xx	xx	1.16E-12	xx	xx	2.57E-12	xx	3.73E-12	3.26E-15	9.12E-15
DDE	xx	xx	xx	xx	7.22E-12	xx	xx	3.30E-12	xx	1.05E-11	9.18E-15	2.57E-14
DDT	xx	xx	xx	xx	5.89E-12	xx	xx	8.50E-12	xx	1.44E-11	1.26E-14	3.52E-14

(a) - Concentration in air = Conc. in soil (mg/kg) x airborne dust conc (mg/m3) x 1E-06 (kg/mg). Soil concentration is the 95 percent upper confidence limit on the arithmetic mean of surface soil data (samples less than 2 feet deep). Non-detects are replaced with one-half the detection level for calculating the soil concentration. Airborne dust concentration were taken from Appendix E.

(b) - The exposure point concentration is the sum of site-specific airborne contaminant concentrations. The assumption is made that the contaminants are distributed in the air in the same proportion as they are in the surface soil.

(c) - The soil concentration used to calculate the concentration in air is the maximum detected concentration, which is less than the 95 percent upper confidence limit on the arithmetic mean.

"--" - Not calculated because contaminant is not considered a carcinogen or potency factor is not available.

"xx" - Not calculated since chemical was not identified as a contaminant of concern at this site.

* - Replaces original Table 6-34 in the Final Baseline RA; Dames & Moore, 1992a.

**-Site at which followup fieldwork was conducted.

TABLE 6-35*

Estimated Contaminant Concentrations in Air and Estimated Human Intakes Due to Inhalation of Dust Current Land Use Scenario, Worker at Bldg 612

	Concentration in Air (mg/m3) (a)									Exposure Point Concentration	Carcinogenic Intake	Noncarcinogenic Intake
Analyte	Site 18**	Site 57 II	Site 16	Site 38	Site 57 I	Site 19**	Site 9	Site 15**	Site 45 I	(mg/m3)(b)	(mg/kg/day)	(mg/kg/day)
Airborne Dust	1.79E-04	3.40E-05	1.07E-02	8.39E-05	9.28E-05	4.15E-04	4.23E-04	2.01E-05	5.30E-04			
Aluminum	3.24E-06	xx	xx	xx	xx	5.24E-06	xx	xx	xx	8.49E-06	–	2.08E-07
Antimony	xx	xx	xx	xx	xx	3.69E-07	5.75E-09	1.90E-08	xx	3.94E-07	–	9.64E-09
Arsenic	8.64E-10	xx	xx	xx	xx	2.91E-08	xx	1.81E-10	xx	3.02E-08	2.63E-10	7.38E-10
Barium	5.54E-08	xx	4.55E-06	xx	xx	3.36E-06	xx	4.70E-08	xx	8.01E-06	–	1.96E-07
Beryllium	xx	xx	xx	xx	xx	xx	xx	9.09E-11	xx	9.09E-11	7.94E-13	2.22E-12
Cadmium	xx	xx	3.53E-08	1.93E-10	xx	7.59E-08	1.78E-09	1.64E-08	xx	1.30E-07	1.13E-09	3.17E-09
Chromium	8.07E-09	xx	xx	xx	xx	9.12E-09	9.35E-09	4.11E-08	xx	6.76E-08	5.91E-10	1.65E-09
Cobalt	xx	xx	2.03E-07	xx	xx	xx	xx	1.57E-09	xx	2.04E-07	–	4.99E-09
Copper	1.16E-08	4.31E-09 (c)	1.26E-06	3.58E-07	xx	1.31E-05	xx	2.08E-08	7.58E-08 (d)	1.49E-05	–	3.64E-07
Cyanide	xx	xx	1.22E-08	xx	xx	xx	xx	xx	xx	1.22E-08	–	2.97E-10
Iron	xx	xx	xx	2.38E-06	xx	xx	xx	1.09E-06	xx	3.47E-06	–	8.49E-08
Lead	4.48E-08	5.77E-09 (c)	xx	6.45E-10	4.23E-09 (d)	5.08E-07	3.30E-08	8.06E-09	8.00E-09 (d)	6.13E-07	–	1.50E-08
Magnesium	xx	xx	xx	xx	xx	xx	xx	1.64E-07	xx	1.64E-07	–	4.01E-09
Manganese	1.88E-07	xx	xx	xx	xx	xx	xx	1.74E-08	xx	2.05E-07	–	5.02E-09
Mercury	xx	1.73E-10 (c)	xx	1.99E-11	1.27E-11 (d)	3.69E-10	xx	1.49E-12	xx	5.76E-10	–	1.41E-11
Nickel	3.57E-08	7.98E-10 (c)	xx	1.71E-09	xx	9.75E-09	xx	2.05E-09	2.39E-08 (d)	7.38E-08	6.45E-10	1.81E-09
Potassium	xx	8.01E-08 (c)	xx	1.65E-07	2.08E-07 (d)	1.10E-06	xx	4.03E-08	xx	1.61E-06	–	3.95E-08
Selenium	xx	xx	xx	xx	xx	xx	xx	3.36E-11	xx	3.36E-11	–	8.22E-13
Silver	1.81E-10	1.56E-11 (c)	1.59E-08	4.70E-12	xx	5.68E-10	2.24E-11	1.36E-11	xx	1.67E-08	–	4.08E-10
Sodium	3.15E-07	xx	xx	xx	xx	2.99E-07	xx	1.73E-08	xx	6.32E-07	–	1.55E-08
Thallium	xx	xx	xx	xx	xx	xx	xx	4.30E-09	xx	4.30E-09	–	1.05E-10
Zinc	1.75E-07	1.32E-08 (c)	xx	2.31E-07	1.51E-08 (d)	2.50E-05	9.69E-08	1.50E-07	7.74E-08 (d)	2.58E-05	–	6.31E-07
1,1,1-Trichloroethan	1.26E-12 (c)	xx	xx	xx	xx	xx	xx	xx	xx	1.26E-12	–	3.07E-14
Di-n-butyl phthalate	2.64E-11	xx	xx	xx	xx	xx	xx	xx	xx	2.64E-11	–	6.45E-13
Phenanthrene	8.43E-12 (c)	xx	xx	xx	xx	xx	xx	xx	xx	8.43E-12	–	2.06E-13
DDE	1.08E-12	xx	xx	xx	xx	xx	xx	xx	xx	1.08E-12	–	2.63E-14
DDT	1.26E-12	xx	xx	xx	xx	xx	xx	xx	xx	1.26E-12	1.10E-14	3.07E-14
135TNB	xx	xx	xx	xx	xx	1.65E-08	xx	5.89E-11	xx	1.66E-08	–	4.05E-10
246TNT	xx	xx	xx	xx	xx	4.15E-06	xx	1.91E-09	xx	4.16E-06	–	1.02E-07
HMX	xx	xx	xx	xx	xx	xx	6.05E-10	2.23E-10	xx	8.28E-10	–	2.03E-11
RDX	xx	xx	1.41E-08	xx	xx	xx	2.92E-10	9.65E-10	xx	1.53E-08	–	3.75E-10
24DNT	xx	xx	xx	xx	xx	xx	xx	3.02E-11	xx	3.02E-11	–	7.38E-13
26DNT	xx	xx	xx	xx	xx	xx	xx	2.25E-12	xx	2.25E-12	–	5.51E-14
Nitrobenzene	xx	xx	xx	xx	xx	1.34E-09 (c)	xx	xx	xx	1.34E-09	–	3.28E-11
Tetryl	xx	6.66E-11 (c)	xx	xx	xx	6.14E-10 (c)	xx	xx	xx	6.82E-10	–	1.67E-11
Nitrate/nitrite	xx	xx	1.66E-07	xx	xx	4.64E-09	xx	1.63E-09 (c)	xx	1.73E-07	–	4.22E-09

(a) - Concentration in air = Conc. in soil (mg/kg) x Airborne dust conc (mg/m3) x 1E-06 (kg/mg). Soil concentration is the 95 percent uper confidence limit on the arithmetic mean of surface soil data (samples less than 2 feet deep). Non-detects are replaced with one-half the detection level for calculating the soil concentration. Airbonre dust concentrations were taken from Appendix E.

(b) - The exposure point concentration is the sum of site-specific airborne contaminant concentrations. The assumption is made that the contaminants are distributed in the air in the same proportion as they are in the surface soil.

(c) - The soil concentration used to calculate the concentration in air is the maximum detected concentration in surface soil, which is less than the 95 percent upper confidence limit on the arithmetic mean.

(d) - The soil concentration used to calculate the concentration in air is the only detected concentration in surface soil.

"–" - Not calculated because contaminant is not considered a carcinogen or potency factor is not available.

"xx" - Not calculated since chemical was not identified as a contaminant of concern at this site.

* - Replaces original Table 6-35 in the Final Baseline RA; Dames & Moore, 1992a.

** - Site at which followup fieldwork was conducted

concentrations are then summed across the nine sites to obtain exposure point concentrations for the Building 612 workers.

6.5.1.9* Workers at Building 617. Table 6-36* presents estimated exposure point concentrations and carcinogenic and noncarcinogenic intakes for the workers at Building 617 via inhalation of contaminated soil as airborne dust (pathway 3), the only pathway quantitatively evaluated for these receptors. Concentrations of contaminants of concern in airborne dust from each of the seven relevant sites--Sites 16, 41, 45 (Building 617), and 57 (Location I), and followup fieldwork Sites 15, 18, and 19--are calculated according to Equation B provided in Table 6-14 of the Baseline RA, using the 95 percent UCL on the arithmetic mean of surface soil data (to a depth of 2 feet). These soil concentrations are obtained from occurrence and distribution tables presented in Section 3.0*. The site-specific airborne dust contaminant concentrations are then summed across the seven sites to obtain exposure point concentrations for the Building 617 workers.

6.5.1.10* Eastern Boundary Residents. Table 6-37* presents estimated exposure point concentrations and carcinogenic and noncarcinogenic intakes for the eastern boundary residents via inhalation of contaminated soil as airborne dust (pathway 3), the only pathway quantitatively evaluated for these receptors. The eastern boundary residents are located just outside of the installation, in the predominant downwind direction. Concentrations of contaminants of concern in airborne dust from each of the 22 relevant sites--Sites 4, 9, 10, 16, 21, 25 (Location I), 31, 38, 39, 47, 52, 57 (Locations I, II, and III), 60, 67, and 81 (Location I), and followup fieldwork Sites 5, 15, 18, 19, and 26--are calculated according to Equation B provided in Table 6-14 of the Baseline RA, using the 95 percent UCL on the arithmetic mean of surface soil data (to a depth of 2 feet). These soil concentrations are obtained from occurrence and distribution tables presented in Section 3.0*. The site-specific airborne dust contaminant concentrations are then summed across the 22 sites to obtain exposure point concentrations for the offsite eastern boundary residents.

TABLE 6-36*

Estimated Contaminant Concentrations in Air and Estimated Human Intakes Due to Inhalation of Dust Current Land Use Scenario, Worker at Bldg 617

Analyte	Concentration in Air (mg/m3) (a) Site 16	Site 18	Site 57 I	Site 19	Site 41	Site 15	Site 45 II	Exposure Point Concentration (mg/m3)(b)	Carcinogenic Intake (mg/kg/day)	Noncarcino-genic Intake (mg/kg/day)
Airborne Dust	1.10E-04	1.69E-02	5.78E-05	5.50E-04	7.08E-05	1.21E-05	8.23E-04			
Aluminum	1.99E-06	xx	xx	6.95E-06	xx	xx	xx	8.95E-06	--	2.19E-07
Antimony	xx	xx	xx	4.90E-07	5.96E-10 (c)	1.14E-08	xx	5.02E-07	--	1.23E-08
Arsenic	5.31E-10	xx	xx	3.86E-08	xx	1.09E-10	xx	3.93E-08	3.43E-10	9.60E-10
Barium	3.40E-08	7.22E-06	xx	4.46E-06	xx	2.81E-08	xx	1.17E-05	--	2.87E-07
Beryllium	xx	xx	xx	xx	xx	5.45E-11	xx	5.45E-11	4.76E-13	1.33E-12
Cadmium	xx	5.60E-08	xx	1.01E-07	xx	9.84E-09	xx	1.67E-07	1.45E-09	4.07E-09
Chromium	4.96E-09*	xx	xx	1.21E-08	xx	2.46E-08	xx	4.17E-08	3.64E-10	1.02E-09
Cobalt	xx	3.21E-07	xx	xx	xx	9.44E-10	xx	3.22E-07	--	7.89E-09
Copper	7.13E-09	2.00E-06	xx	1.74E-05	xx	1.25E-08	xx	1.94E-05	--	4.76E-07
Cyanide	xx	1.93E-08	xx	xx	xx	xx	xx	1.93E-08	--	4.72E-10
Iron	xx	xx	xx	xx	xx	6.52E-07	2.63E-05 (d)	2.70E-05	--	6.60E-07
Lead	2.75E-08	xx	2.64E-09 (d)	6.74E-07	1.15E-09 (c)	4.83E-09	xx	7.10E-07	--	1.74E-08
Magnesium	xx	xx	xx	xx	xx	9.81E-08	xx	9.81E-08	--	2.40E-09
Manganese	1.15E-07	xx	xx	xx	xx	1.04E-08	xx	1.26E-07	--	3.08E-09
Mercury	xx	xx	7.92E-12 (d)	4.89E-10	xx	8.92E-13	xx	4.98E-10	--	1.22E-11
Nickel	2.19E-08	xx	xx	1.29E-08	xx	1.23E-09	1.92E-08 (d)	5.52E-08	4.83E-10	1.35E-09
Potassium	xx	xx	1.29E-07 (d)	1.46E-06	xx	2.41E-08	xx	1.61E-06	--	3.94E-08
Selenium	xx	xx	xx	xx	xx	2.01E-11	xx	2.01E-11	--	4.92E-13
Silver	1.11E-10	2.52E-08	xx	7.54E-10	xx	8.15E-12	3.70E-11 (d)	2.61E-08	--	6.39E-10
Sodium	1.94E-07	xx	xx	3.97E-07	xx	1.04E-08	xx	6.01E-07	--	1.47E-08
Thallium	xx	xx	xx	xx	xx	2.58E-09	xx	2.58E-09	--	6.31E-11
Zinc	1.08E-07	xx	9.42E-09 (d)	3.32E-05	xx	9.02E-08	8.89E-08 (d)	3.35E-05	--	8.19E-07
1,1,1-Trichloroethane	7.71E-13 (c)	xx	xx	xx	xx	xx	xx	7.71E-13	--	1.89E-14
135TNB	xx	xx	xx	2.19E-08	xx	3.53E-11	xx	2.19E-08	--	5.36E-10
246TNT	xx	1.81E-08	xx	5.51E-06	xx	1.15E-09	xx	5.53E-06	4.83E-08	1.35E-07
HMX	xx	xx	xx	xx	xx	1.34E-10	xx	1.34E-10	--	3.27E-12
RDX	xx	2.23E-08	xx	xx	xx	5.78E-10	xx	2.29E-08	2.00E-10	5.60E-10
24DNT	xx	xx	xx	xx	xx	1.81E-11	xx	1.81E-11	1.58E-13	4.42E-13
26DNT	xx	xx	xx	xx	xx	1.35E-12	xx	1.35E-12	1.18E-14	3.30E-14
Nitrobenzene	xx	xx	xx	1.78E-09 (c)	xx	xx	xx	1.78E-09	--	4.35E-11
Tetryl	xx	xx	xx	8.14E-10 (c)	xx	xx	xx	8.14E-10	--	1.99E-11
Nitrate/nitrite	xx	2.64E-07	xx	6.16E-09	xx	9.76E-10 (c)	xx	2.71E-07	--	6.63E-09
Di-n-butyl phthalate	1.62E-11	xx	xx	xx	1.45E-11 (c)	xx	xx	3.07E-11	--	7.51E-13
Phenanthrene	5.18E-12 (c)	xx	xx	xx	xx	xx	xx	5.18E-12	--	1.27E-13
DDE	6.61E-13	xx	xx	xx	xx	xx	xx	6.61E-13	5.77E-15	1.62E-14
DDT	7.71E-13	xx	xx	xx	xx	xx	xx	7.71E-13	6.74E-15	1.89E-14

(a) – Concentration in air = Conc. in soil (mg/kg) x airborne dust conc (mg/m3) x 1E-06 (kg/mg). Soil concentration is the 95 percent upper confidence limit on the arithmetic mean of surface soil data (samples less than 2 feet deep). Non-detects are replaced with one-half the detection level for calculating the soil concentration. Airborne dust concentrations were taken from Appendix E.

(b) – The exposure point concentration is the sum of site-specific airborne contaminant concentrations. The assumption is made that the contaminants are distributed in the air in the same proportion as they are in the surface soil.

(c) – The soil concentration used to calculate the concentration in air is the maximum detected concentration in surface soil, which is less than the 95 percent upper confidence limit on the arithmetic mean.

(d) – The soil concentration used to calculate the concentration in air is the only detected concentration in surface soil.

"--" – Not calculated because contaminant is not considered a carcinogen or potency factor is not available.

"xx" – Not calculated since chemical was not identified as a contaminant of concern at this site.

* – Replaces original Table 6-36 in the Final Baseline RA; Dames & Moore, 1992a.

TABLE 6-37*
Estimated Contaminant Concentrations in Air and Esti[illegible] Human Intakes
Due to Inhalation of Dust
Current Land Use Scenario, Eastern Boundary Residents

Analyte	Concentrations in Air (mg/m3) (a)								
	Site 52	Site 16**	Site 57 II	Site 57 III	Site 21	Site 16	Site 38	Site 31	Site 60
Airborne Dust	3.14E-05	7.58E-06	7.14E-06	5.61E-05	4.11E-05	1.39E-03	3.49E-05	2.79E-05	1.87E-05
Aluminum	xx	1.37E-07	xx	xx	xx	xx	xx	xx	xx
Antimony	xx	xx	xx	xx	xx	xx	xx	xx	xx
Arsenic	xx	3.66E-11	xx	2.10E-10	xx	xx	xx	xx	xx
Barium	xx	2.34E-09	xx	xx	xx	5.92E-07	xx	8.78E-09	xx
Beryllium	xx	xx	xx	xx	xx	xx	xx	xx	xx
Cadmium	xx	xx	xx	3.26E-10	xx	4.59E-09	8.02E-11	xx	xx
Calcium	xx	xx	xx	xx	xx	xx	xx	xx	xx
Chromium	xx	3.41E-10	xx	xx	xx	xx	xx	xx	xx
Cobalt	xx	xx	xx	xx	xx	2.63E-08	xx	xx	xx
Copper	3.86E-09	4.90E-10	9.07E-10 (c)	1.01E-08	xx	1.64E-07	1.49E-07	xx	xx
Cyanide	xx	xx	xx	xx	xx	1.58E-09	xx	xx	xx
Iron	xx	xx	xx	xx	xx	xx	9.89E-07	1.54E-06	xx
Lead	4.93E-10	1.90E-09	1.21E-09 (c)	8.35E-09	xx	xx	2.68E-10	1.09E-09	2.13E-10 (c)
Magnesium	xx	xx	xx	xx	xx	xx	xx	xx	xx
Manganese	xx	7.94E-09	xx	xx	xx	xx	xx	xx	xx
Mercury	xx	xx	3.64E-11 (c)	3.25E-12	xx	xx	8.27E-12	xx	xx
Nickel	xx	1.51E-09	1.68E-10 (c)	xx	xx	xx	7.12E-10	xx	xx
Potassium	xx	xx	1.69E-08 (c)	1.16E-07	xx	xx	7.70E-08	7.81E-08	xx
Selenium	xx	xx	xx	xx	xx	xx	xx	xx	xx
Silver	xx	7.66E-12	3.28E-12 (c)	1.12E-08	xx	2.06E-09	1.95E-12	1.28E-11	8.99E-13 (c)
Sodium	xx	1.33E-08	xx	xx	xx	xx	xx	8.29E-07	xx
Thallium	xx	xx	xx	xx	xx	xx	xx	xx	xx
Zinc	4.27E-09	7.41E-09	2.78E-09 (c)	3.29E-07	xx	xx	9.60E-08	1.54E-08	xx
1,1,1-Trichloroethane	xx	5.31E-14 (c)	xx	xx	xx	xx	xx	xx	xx
135TNB	xx	xx	xx	xx	xx	xx	xx	4.46E-10	xx
13DNB	xx	xx	xx	xx	xx	xx	xx	xx	xx
246TNT	xx	xx	xx	xx	xx	1.48E-09	1.33E-11	6.08E-08	xx
24DNT	xx	xx	xx	xx	xx	xx	xx	5.80E-11	xx
26DNT	xx	xx	xx	xx	xx	xx	xx	7.94E-12 (c)	xx
HMX	1.83E-11	xx	xx	xx	xx	xx	xx	xx	xx
RDX	2.71E-11	xx	xx	xx	xx	1.83E-09	xx	8.58E-11	xx
Nitrobenzene	xx	xx	xx	xx	xx	xx	xx	xx	xx
Tetryl	xx	xx	1.44E-11 (c)	xx	xx	xx	xx	5.77E-11	xx
Nitrate/nitrite	xx	xx	xx	xx	6.12E-10	2.16E-08	xx	1.29E-09	xx
Benzo(a)anthracene	xx	xx	xx	xx	xx	xx	xx	xx	xx
Benzo(b)fluoranthene	xx	xx	xx	xx	xx	xx	xx	xx	xx
Benzo(k)fluoranthene	xx	xx	xx	xx	xx	xx	xx	xx	xx
Chrysene	xx	xx	xx	xx	xx	xx	xx	xx	xx
Di-n-butyl phthalate	xx	1.11E-12	xx	xx	xx	xx	xx	xx	xx
Fluoranthene	xx	xx	xx	xx	xx	xx	xx	xx	xx
Napthalene	xx	xx	xx	xx	xx	xx	xx	1.42E-12 (c)	xx
Phenanthrene	xx	3.56E-13 (c)	xx	xx	xx	xx	xx	1.25E-11	xx
Pyrene	xx	xx	xx	xx	xx	xx	xx	xx	xx
Chlordane	xx	xx	xx	xx	xx	xx	xx	xx	xx
Dieldrin	xx	xx	xx	xx	xx	xx	xx	2.31E-12	xx
DDD	xx	xx	xx	xx	xx	xx	xx	2.31E-12	xx
DDE	xx	4.55E-14	xx	xx	xx	xx	xx	1.44E-11	xx
DDT	xx	5.31E-14	xx	xx	xx	xx	xx	1.18E-11	xx
PCB 1260	xx	xx	xx	xx	xx	xx	xx	xx	xx

TABLE 6-37* (cont'd)
Estimated Contaminant Concentrations In Air and Estimated Human Intakes Due to Inhalation of Dust
Current Land Use Scenario, Eastern Boundary Residents

Analyte	Concentrations in Air (mg/m3) (a)									
	Site 57 I	Site 19**	Site 26**	Site 81 I	Site 39	Site 15**	Site 4	Site 5**	Site 47**	Site 9
Airborne Dust	6.52E-06	1.77E-05	7.46E-06	5.87E-06	7.71E-06	1.40E-06	4.88E-06	2.34E-06	2.58E-06	1.03E-05
Aluminum	xx	2.24E-07	xx	xx	xx	xx	xx	xx	xx	xx
Antimony	xx	1.58E-08	xx	xx	2.10E-11	1.33E-09	xx	xx	3.90E-10	1.40E-10
Arsenic	xx	1.25E-09	xx	xx	xx	1.26E-11	xx	xx	xx	xx
Barium	xx	1.44E-07	xx	xx	xx	3.27E-09	xx	xx	1.21E-09	xx
Beryllium	xx	xx	xx	xx	xx	6.33E-12	xx	xx	xx	xx
Cadmium	xx	3.25E-09	xx	xx	xx	1.14E-09	xx	xx	6.01E-11	4.33E-11
Calcium	xx	xx	xx	xx	xx	xx	xx	xx	1.89E-07	xx
Chromium	xx	3.90E-10	xx	xx	xx	2.88E-09	xx	xx	1.03E-10	2.27E-10
Cobalt	xx	xx	xx	xx	xx	1.10E-10	xx	xx	xx	xx
Copper	xx	5.62E-07	xx	xx	2.38E-09	1.45E-09	xx	xx	6.81E-10	xx
Cyanide	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx
Iron	xx	xx	xx	xx	xx	7.58E-08	xx	xx	xx	xx
Lead	2.52E-10 (d)	2.17E-08	3.50E-09	5.79E-11 (c)	2.22E-09	5.61E-10	xx	xx	1.10E-09	8.02E-10
Magnesium	xx	xx	xx	xx	xx	1.14E-08	xx	xx	4.12E-08	xx
Manganese	xx	xx	xx	xx	xx	1.21E-09	xx	xx	xx	xx
Mercury	7.56E-13 (d)	1.58E-11	xx	xx	xx	1.04E-13	xx	xx	1.44E-12	xx
Nickel	xx	4.17E-10	xx	xx	xx	1.43E-10	xx	xx	1.22E-10	xx
Potassium	1.24E-08 (d)	4.70E-08	xx	xx	xx	2.80E-09	xx	xx	xx	xx
Selenium	xx	xx	xx	xx	xx	2.34E-12	xx	xx	6.73E-13	xx
Silver	xx	2.43E-11	6.52E-12 (c)	2.58E-13	6.89E-12	9.46E-13	xx	xx	1.65E-12	5.45E-13
Sodium	xx	1.28E-08	xx	xx	xx	1.21E-09	xx	xx	2.39E-09	xx
Thallium	xx	xx	xx	xx	xx	3.00E-10	xx	xx	xx	xx
Zinc	9.00E-10 (d)	1.07E-06	1.40E-09	xx	3.92E-10	1.05E-08	xx	xx	2.48E-09	2.35E-09
1,1,1-Trichloroethane	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx
135TNB	xx	7.06E-10	xx	xx	xx	4.10E-12	6.30E-11	1.33E-11	xx	xx
13DNB	xx	xx	xx	xx	xx	xx	xx	7.07E-13	xx	xx
246TNT	xx	1.78E-07	xx	xx	xx	1.33E-10	4.40E-09	1.77E-09	xx	xx
24DNT	xx	xx	xx	xx	xx	2.10E-12	1.58E-11	1.93E-12	xx	xx
26DNT	xx	xx	xx	xx	xx	1.57E-13	xx	xx	xx	xx
HMX	xx	xx	xx	xx	xx	1.55E-11	1.17E-10	4.12E-11	xx	1.47E-11
RDX	xx	xx	xx	xx	xx	6.72E-11	1.20E-09	3.86E-10	xx	7.09E-12
Nitrobenzene	xx	5.73E-11 (c)	xx	xx	xx	xx	xx	xx	xx	xx
Tetryl	xx	2.63E-11 (c)	xx	xx	xx	xx	xx	7.93E-12	xx	xx
Nitrate/nitrite	xx	1.99E-10	xx	xx	xx	1.13E-10 (c)	3.55E-11	1.94E-11	4.80E-11	xx
Benzo(a)anthracene	xx	xx	xx	xx	xx	xx	xx	xx	6.42E-13 (c)	xx
Benzo(b)fluoranthene	xx	xx	xx	xx	xx	xx	xx	xx	1.16E-12 (c)	xx
Benzo(k)fluoranthene	xx	xx	xx	xx	xx	xx	xx	xx	5.93E-13 (c)	xx
Chrysene	xx	xx	xx	xx	xx	xx	xx	xx	1.24E-12 (c)	xx
Di-n-butyl phthalate	xx	xx	xx	xx	xx	xx	xx	xx	2.10E-12	xx
Fluoranthene	xx	xx	xx	xx	xx	xx	xx	xx	7.59E-13 (c)	xx
Napthalene	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx
Phenanthrene	xx	xx	xx	xx	xx	xx	xx	xx	2.40E-13 (c)	xx
Pyrene	xx	xx	xx	xx	xx	xx	xx	xx	8.39E-13 (c)	xx
Chlordane	xx	xx	xx	xx	xx	xx	xx	xx	7.82E-13	xx
Dieldrin	xx	xx	xx	xx	xx	xx	xx	xx	1.81E-14	xx
DDD	xx	xx	xx	xx	xx	xx	xx	xx	4.54E-13	xx
DDE	xx	xx	xx	xx	xx	xx	xx	xx	1.81E-14	xx
DDT	xx	xx	xx	xx	xx	xx	xx	xx	1.73E-13	xx
PCB 1260	xx	xx	xx	xx	xx	xx	xx	xx	8.67E-13	xx

TABLE 6-37* (cont'd)
Estimated Contaminant Concentrations In Air and Estima[illegible]man Intakes
Due to Inhalation of Dust
Current Land Use Scenario, Eastern Boundary Residents

Analyte	Site 10	Site 67	Site 251	Exposure Point Concentration (mg/m3)(b)	Carcinogenic Intake (mg/kg/day)	Noncarcino-genic Intake (mg/kg/day)
Airborne Dust	8.61E-06	5.11E-06	2.48E-06			
Aluminum	xx	xx	xx	3.61E-07	--	9.90E-08
Antimony	6.00E-11 (d)	xx	xx	1.77E-08	--	4.86E-09
Arsenic	xx	xx	xx	1.50E-09	1.77E-10	4.12E-10
Barium	xx	xx	xx	7.51E-07	--	2.06E-07
Beryllium	xx	xx	xx	6.33E-12	7.43E-13	1.73E-12
Cadmium	xx	xx	xx	9.49E-09	1.11E-09	2.60E-09
Calcium	xx	xx	xx	1.89E-07	--	5.18E-08
Chromium	xx	xx	xx	3.92E-09	4.60E-10	1.07E-09
Cobalt	xx	xx	xx	2.64E-08	--	7.24E-09
Copper	xx	xx	xx	8.95E-07	--	2.45E-07
Cyanide	xx	xx	xx	1.58E-09	--	4.33E-10
Iron	xx	xx	xx	2.61E-06	--	7.15E-07
Lead	xx	2.20E-10 (d)	2.08E-11	4.40E-08	--	1.21E-08
Magnesium	xx	xx	xx	5.26E-08	--	1.44E-08
Manganese	xx	xx	xx	9.15E-09	--	2.51E-09
Mercury	xx	xx	xx	6.60E-11	--	1.81E-11
Nickel	xx	xx	xx	3.07E-09	3.60E-10	8.41E-10
Potassium	xx	xx	xx	3.50E-07	--	9.60E-08
Selenium	xx	xx	xx	3.01E-12	--	8.25E-13
Silver	xx	xx	xx	1.33E-08	--	3.64E-09
Sodium	xx	xx	xx	8.58E-07	--	2.35E-07
Thallium	xx	xx	8.75E-11	3.87E-10	--	1.06E-10
Zinc	xx	xx	xx	1.54E-06	--	4.23E-07
1,1,1-Trichloroethane	xx	xx	xx	5.31E-14	--	1.45E-14
135TNB	xx	xx	xx	1.23E-09	--	3.38E-10
13DNB	xx	xx	xx	7.07E-13	--	1.94E-13
246TNT	xx	xx	xx	2.46E-07	2.89E-08	6.75E-08
24DNT	xx	xx	xx	7.78E-11	9.13E-12	2.13E-11
26DNT	xx	xx	xx	8.10E-12	9.51E-13	2.22E-12
HMX	xx	xx	xx	2.07E-10	--	5.67E-11
RDX	xx	xx	xx	3.60E-09	4.23E-10	9.87E-10
Nitrobenzene	xx	xx	xx	5.73E-11	--	1.57E-11
Tetryl	xx	xx	xx	1.06E-10	--	2.91E-11
Nitrate/nitrite	xx	xx	xx	2.39E-08	--	6.56E-09
Benzo(a)anthracene	xx	xx	xx	6.42E-13	7.54E-14	1.76E-13
Benzo(b)fluoranthene	xx	xx	xx	1.16E-12	1.36E-13	3.17E-13
Benzo(k)fluoranthene	xx	xx	xx	5.93E-13	6.97E-14	1.63E-13
Chrysene	xx	xx	xx	1.24E-12	1.46E-13	3.40E-13
Di-n-butyl phthalate	xx	xx	xx	3.21E-12	--	8.80E-13
Fluoranthene	xx	xx	xx	7.59E-13	--	2.08E-13
Napthalene	xx	xx	xx	1.42E-12	--	3.89E-13
Phenanthrene	xx	xx	xx	1.31E-11	--	3.60E-12
Pyrene	xx	xx	xx	8.39E-13	--	2.30E-13
Chlordane	xx	xx	xx	7.82E-13	9.18E-14	2.14E-13
Dieldrin	xx	xx	xx	2.33E-12	2.74E-13	6.39E-13
DDD	xx	xx	xx	2.77E-12	3.25E-13	7.58E-13
DDE	xx	xx	xx	1.45E-11	1.70E-12	3.97E-12
DDT	xx	xx	xx	1.20E-11	1.41E-12	3.29E-12
PCB 1260	xx	xx	xx	8.67E-13	1.02E-13	2.38E-13

(a) - Concentration in air = Conc. in soil (mg/kg) x airborne dust conc (mg/m3) x 1E-06 (kg/mg). Soil concentration is the 95 percent upper confidence limit on the arithmetic mean of surface soil data (samples less than 2 feet deep). Non-detects are replaced with one-half the detection level for calculating the soil concentration. Airborne dust concentrations were taken from Appendix E.

(b) - The exposure point concentration is the sum of site-specific airborne contaminant concentrations. The assumption is made that the contaminants are distributed in the air in the same proportion as they are in the surface soil.

(c) - The soil concentration used to calculate the concentration in air is the maximum concentration detected in surface soil, which is less than the 95 percent upper confidence limit on the arithmetic mean.

(d) - The soil concentration used to calculate the concentration in air is the only detected concentration in surface soil.

"--" - Not calculated because contaminant is not considered a carcinogen or potency factor is not available.

"xx" - Not calculated since chemical was not identified as a contaminant of concern at this site.

* - Replaces original Table 6-37 in the Final Baseline RA; Dames & Moore, 1992a.

** - Site at which followup fieldwork was conducted

6.5.1.11* <u>Hermiston Residents</u>. Table 6-38* presents estimated exposure point concentrations and carcinogenic and noncarcinogenic intakes for Hermiston residents via inhalation of contaminated soil as airborne dust (pathway 3), the only pathway quantitatively evaluated for these receptors. The Hermiston residents are located near the fairgrounds, in a predominant downwind direction. Concentrations of contaminants of concern in airborne dust from each of the 22 relevant sites--Sites 9, 10, 16, 21, 25 (Locations I and II), 31, 38, 39, 41, 52, 53, 57 (Locations I, II, and III), 60, and 81 (Location I), and followup fieldwork Sites 15, 18, 19, 22, and 26--are calculated according to Equation B provided in Table 6-14 of the Baseline RA, using the 95 percent UCL on the arithmetic mean of surface soil data (to a depth of 2 feet). These soil concentrations are obtained from occurrence and distribution tables presented in Section 3.0*. The site-specific airborne dust contaminant concentrations are then summed across the 22 sites to obtain exposure point concentrations for the offsite Hermiston residents.

6.5.1.12* <u>Western Boundary Residents</u>. Table 6-39* presents estimated exposure point concentrations and carcinogenic and noncarcinogenic intakes for the western boundary residents via inhalation of contaminated soil as airborne dust (pathway 3), the only pathway quantitatively evaluated for these receptors. The residents are assumed to be located just outside of the installation, near the western boundary and the ADA Area of UMDA. Concentrations of contaminants of concern in airborne dust from each of the three relevant sites--Site 16 and followup fieldwork Sites 15 and 19--are calculated according to Equation B in Table 6-14 of the Baseline RA, using the 95 percent UCL on the arithmetic mean of surface soil data (to a depth of 2 feet). These soil concentrations are obtained from occurrence and distribution tables presented in Section 3.0*. The site-specific airborne dust concentrations are then summed across the three sites to obtain exposure point concentrations for the offsite western boundary residents.

6.5.1.13* <u>Irrigon Residents</u>. Table 6-40* presents estimated exposure point concentrations and carcinogenic and noncarcinogenic intakes for Irrigon residents via

TABLE 6-38*

Estimated Contaminant Concentrations in Air and Estimated Human Intakes Due to Inhalation of Dust
Current Land Use Scenario, Hermiston Residents

Analyte	Concentrations in Air (mg/m3) (a)											
	Site 52	Site 18	Site 57 II	Site 57 III	Site 21	Site 16	Site 38	Site 31	Site 60	Site 57 I	Site 19	Site 26
Airborne Dust	5.83E-06	5.70E-06	4.82E-06	2.70E-05	1.84E-05	6.51E-04	2.26E-05	1.54E-05	8.78E-06	4.01E-06	1.34E-05	3.06E-06
Aluminum	xx	1.03E-07	xx	xx	xx	xx	xx	xx	xx	xx	1.69E-07	xx
Antimony	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	1.19E-08	xx
Arsenic	xx	2.75E-11	xx	1.01E-10	xx	xx	xx	xx	xx	xx	9.38E-10	xx
Barium	xx	1.76E-09	xx	xx	xx	2.78E-07	xx	4.84E-09	xx	xx	1.08E-07	xx
Beryllium	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx
Cadmium	xx	xx	xx	1.57E-10	xx	2.15E-09	5.21E-11	xx	xx	xx	2.44E-09	xx
Chromium	xx	2.57E-10	xx	xx	xx	xx	xx	xx	xx	xx	2.94E-10	xx
Cobalt	xx	xx	xx	xx	xx	1.24E-08	xx	xx	xx	xx	xx	xx
Copper	7.17E-10	3.69E-10	6.12E-10 (c)	4.88E-09	xx	7.68E-08	9.67E-08	xx	xx	xx.	4.23E-07	xx
Cyanide	xx	xx	xx	xx	xx	7.42E-10	xx	xx	xx	xx	xx	xx
Iron	xx	xx	xx	xx	xx	xx	6.42E-07	8.50E-07	xx	xx	xx	xx
Lead	9.15E-11	1.43E-09	8.19E-10 (c)	4.02E-09	xx	xx	1.74E-10	5.99E-10	1.00E-10 (c)	1.83E-10 (d)	1.64E-08	1.44E-09
Magnesium	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx
Manganese	xx	5.97E-09	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx
Mercury	xx	xx	2.46E-11 (c)	1.56E-12	xx	xx	5.37E-12	xx	xx	5.49E-13 (d)	1.19E-11	xx
Nickel	xx	1.13E-09	1.13E-10 (c)	xx	xx	xx	4.62E-10	xx	xx	xx	3.14E-10	xx
Potassium	xx	xx	1.14E-06 (c)	5.59E-06	xx	xx	5.00E-06	4.30E-06	xx	8.98E-09 (d)	3.54E-08	xx
Selenium	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx
Silver	xx	5.76E-12	2.21E-12 (c)	5.37E-09	xx	9.70E-10	1.27E-12	7.08E-12	4.21E-13 (c)	xx	1.83E-11	2.67E-12 (c)
Sodium	xx	1.00E-06	xx	xx	xx	xx	xx	4.56E-07	xx	xx	9.65E-09	xx
Thallium	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx
Zinc	7.93E-10	5.57E-09	1.88E-09 (c)	1.56E-07	xx	xx	6.23E-06	8.50E-09	xx	6.54E-10 (d)	8.06E-07	5.75E-10
1,1,1-Trichloroethane	xx	3.99E-14 (c)	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx
135TNB	xx	xx	xx	xx	xx	xx	xx	2.46E-10	xx	xx	5.32E-10	xx
246TNT	xx	xx	xx	xx	xx	6.97E-10	8.63E-12	3.35E-08	xx	xx	1.34E-07	xx
24DNT	xx	xx	xx	xx	xx	xx	xx	3.19E-11	xx	xx	xx	xx
26DNT	xx	xx	xx	xx	xx	xx	xx	4.37E-12 (c)	xx	xx	xx	xx
HMX	3.39E-12	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx
RDX	5.04E-12	xx	xx	xx	xx	8.59E-10	xx	4.73E-11	xx	xx	xx	xx
Nitrobenzene	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	4.32E-11 (c)	xx
Tetryl	xx	xx	9.74E-12 (c)	xx	xx	xx	xx	3.18E-11	xx	xx	1.98E-11 (c)	xx
Nitrate/nitrite	xx	xx	xx	xx	2.74E-10	1.02E-08	xx	7.09E-10	xx	xx	1.50E-10	xx
Anthracene	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx
Di-n-butyl phthalate	xx	8.38E-13	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx
Napthalene	xx	xx	xx	xx	xx	xx	xx	7.83E-13 (c)	xx	xx	xx	xx
Phenanthrene	xx	2.68E-13 (c)	xx	xx	xx	xx	xx	6.91E-12	xx	xx	xx	xx
Pyrene	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx
Dieldrin	xx	xx	xx	xx	xx	xx	xx	1.27E-12	xx	xx	xx	xx
DDD	xx	xx	xx	xx	xx	xx	xx	1.27E-12	xx	xx	xx	xx
DDE	xx	3.42E-14	xx	xx	xx	xx	xx	7.95E-12	xx	xx	xx	xx
DDT	xx	3.99E-14	xx	xx	xx	xx	xx	6.49E-12	xx	xx	xx	xx

TABLE 6–36* (cont'd)

Estimated Contaminant Concentrations in Air and Estimated Human Intakes Due to Inhalation of Dust Current Land Use Scenario, Hermiston Residents

Analyte	Concentrations in Air (mg/m3) (a)										Exposure Point Concentration (mg/m3) (b)	Carcinogenic Intake (mg/kg/day)	Noncarcinogenic Intake (mg/kg/day)
	Site 81 I	Site 39	Site 22	Site 25 II	Site 53	Site 9	Site 10	Site 41	Site 25 I	Site 15			
Airborne Dust	3.02E–06	3.86E–05	2.24E–06	1.50E–06	1.45E–06	7.24E–06	5.66E–06	1.01E–06	1.00E–06	1.00E–06			
Aluminum	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	2.72E–07	--	7.45E–08
Antimony	xx	1.05E–10	7.35E–11	xx	xx	9.85E–11	3.95E–11 (d)	8.49E–12 (c)	xx	9.47E–10	1.32E–08	--	3.61E–09
Arsenic	xx	xx	xx	xx	xx	xx	xx	xx	xx	9.01E–12	1.08E–09	1.26E–10	2.95E–10
Barium	xx	xx	2.82E–10	xx	xx	xx	xx	xx	xx	2.34E–09	3.95E–07	--	1.08E–07
Beryllium	xx	xx	xx	xx	xx	xx	xx	xx	xx	4.52E–12	4.52E–12	5.31E–13	1.24E–12
Cadmium	xx	xx	2.28E–11	xx	xx	3.05E–11	xx	xx	xx	8.17E–10	5.68E–09	6.67E–10	1.56E–09
Chromium	xx	xx	xx	xx	xx	1.60E–10	xx	xx	xx	2.04E–09	2.75E–09	3.23E–10	7.54E–10
Cobalt	xx	xx	xx	xx	xx	xx	xx	xx	xx	7.83E–11	1.24E–08	--	3.41E–09
Copper	xx	1.19E–08	1.66E–09	xx	xx	xx	xx	xx	xx	1.03E–09	6.18E–07	--	1.69E–07
Cyanide	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	7.42E–10	--	2.03E–10
Iron	xx	xx	xx	xx	xx	xx	xx	xx	xx	5.41E–06	1.55E–06	--	4.24E–07
Lead	2.96E–11 (c)	1.11E–08	2.19E–09	xx	xx	5.65E–10	xx	1.65E–11 (c)	8.30E–12	4.01E–10	3.95E–08	--	1.08E–08
Magnesium	xx	xx	xx	xx	xx	xx	xx	xx	xx	8.14E–09	8.14E–09	--	2.23E–09
Manganese	xx	xx	xx	xx	xx	xx	xx	xx	xx	6.66E–10	6.83E–09	--	1.87E–09
Mercury	xx	xx	3.83E–13	xx	xx	xx	xx	xx	xx	7.40E–14	4.44E–11	--	1.22E–11
Nickel	xx	xx	xx	1.86E–11	4.06E–11 (d)	xx	xx	xx	xx	1.02E–10	2.18E–09	2.57E–10	5.99E–10
Potassium	xx	xx	3.40E–09	xx	3.47E–09 (d)	xx	xx	xx	xx	2.00E–09	2.14E–07	--	5.85E–08
Selenium	xx	xx	xx	xx	xx	xx	xx	xx	xx	1.67E–12	1.67E–12	--	4.58E–13
Silver	1.33E–13	3.45E–11	3.52E–13	xx	xx	3.84E–13	xx	xx	xx	6.76E–13	6.41E–09	--	1.76E–09
Sodium	xx	xx	xx	xx	xx	xx	xx	xx	xx	8.61E–10	4.77E–07	--	1.31E–07
Thallium	xx	xx	xx	3.21E–11	xx	xx	xx	xx	3.53E–11	2.14E–10	2.81E–10	--	7.71E–11
Zinc	xx	1.96E–09	1.20E–09	xx	xx	1.66E–09	xx	xx	xx	7.48E–09	1.06E–06	--	2.90E–07
1,1,1–Trichloroethane	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	3.99E–14	--	1.09E–14
135TNB	xx	xx	xx	xx	xx	xx	xx	xx	xx	2.93E–12	7.80E–10	--	2.14E–10
246TNT	xx	xx	xx	xx	xx	xx	xx	xx	xx	9.51E–11	1.68E–07	1.97E–08	4.61E–08
24DNT	xx	xx	xx	xx	xx	xx	xx	xx	xx	1.50E–12	3.34E–11	3.93E–12	9.16E–12
26DNT	xx	xx	xx	xx	xx	xx	xx	xx	xx	1.12E–13	4.49E–12	5.27E–13	1.23E–12
HMX	xx	xx	xx	xx	xx	1.04E–11	xx	xx	xx	1.11E–11	2.48E–11	--	6.81E–12
RDX	xx	xx	xx	xx	xx	5.00E–12	xx	xx	xx	4.80E–11	9.65E–10	1.13E–10	2.64E–10
Nitrobenzene	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	4.32E–11	--	1.18E–11
Tetryl	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	6.13E–11	--	1.68E–11
Nitrate/nitrite	xx	xx	xx	xx	xx	xx	xx	xx	xx	8.10E–11 (c)	1.14E–08	--	3.11E–09
Anthracene	xx	xx	xx	xx	1.36E–12 (d)	xx	xx	xx	xx	xx	1.36E–12	--	3.72E–13
Di–n–butyl phthalate	xx	xx	xx	xx	xx	xx	xx	2.07E–13 (c)	xx	xx	1.04E–12	--	2.86E–13
Napthalene	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	7.83E–13	--	2.14E–13
Phenanthrene	xx	xx	xx	xx	9.15E–12 (d)	xx	xx	xx	xx	xx	1.63E–11	--	4.47E–12
Pyrene	xx	xx	xx	xx	3.49E–12 (d)	xx	xx	xx	xx	xx	3.49E–12	--	9.57E–13
Dieldrin	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	1.27E–12	1.50E–13	3.49E–13
DDD	xx	xx	6.74E–14	xx	xx	xx	xx	xx	xx	xx	1.36E–12	1.60E–13	3.73E–13
DDE	xx	xx	1.12E–13	xx	xx	xx	xx	xx	xx	xx	8.10E–12	9.51E–13	2.22E–12
DDT	xx	xx	2.89E–13	xx	xx	xx	xx	xx	xx	xx	6.82E–12	8.01E–13	1.87E–12

(a) – Concentration in air = Conc. in soil (mg/kg) x airborne dust conc (mg/m3) x 1E–06 (kg/mg). Soil concentration is the 95 upper confidence limit on the arithmetic mean of surface soil data (samples less than 2 feet deep). Non–detects are replaced with one–half the detection level for calculating the soil concentration. Airborne dust concentrations were taken from Appendix E.
(b) – The exposure point concentration is the sum of site–specific airborne contaminant concentrations. The assumption is made that the contaminants are distributed in the air in the same proportion as they are in the surface soil.
(c) The soil concentration used to calculate the concentration in air is the maximum concentration detected in surface soil, which is less than the 95 percent upper confidence limit on the arithmetic mean.
(d) The soil concentration used to calculate the concentration in air is the only detected concentration in surface soil.
"--" – Not calculated because contaminant is not considered a carcinogen or potency factor is not available.
"xx" – Not calculated since chemical was not identified as a contaminant of concern at this site.
* – Replaces original Table 6–36 in the Final Baseline RA; Dames & Moore, 1992a.

TABLE 6-39*

Estimated Contaminant Concentrations in Air and Estimated Human Intakes Due to Inhalation of Dust Current Land Use Scenario, Western Boundary Residents

Analyte	Concentration in Air (mg/m3) (a) Site 16**	Site 19**	Site 15**	Exposure Point Concentration (mg/m3)(b)	Carcinogenic Intake (mg/kg/day)	Noncarcinogenic Intake (mg/kg/day)
Airborne Dust	7.85E-02	3.79E-05	9.25E-06			
Aluminum	xx	4.79E-07	xx	4.79E-07	--	3.28E-08
Antimony	xx	3.37E-08	8.76E-09	4.25E-08	--	2.91E-09
Arsenic	xx	2.66E-09	8.33E-11	2.75E-09	4.03E-11	1.88E-10
Barium	3.35E-05	3.07E-07	2.16E-08	3.39E-05	--	2.32E-06
Beryllium	xx	xx	4.18E-11	4.18E-11	6.14E-13	2.86E-12
Cadmium	2.60E-07	6.94E-09	7.56E-09	2.74E-07	4.03E-09	1.88E-08
Chromium	xx	8.34E-10 (c)	1.89E-08	1.97E-08	2.89E-10	1.35E-09
Cobalt	1.49E-06	xx	7.24E-10	1.49E-06	--	1.02E-07
Copper	9.26E-06	1.20E-06	9.57E-09	1.05E-05	--	7.18E-07
Cyanide	8.95E-08	xx	xx	8.95E-08	--	6.13E-09
Iron	xx	xx	5.01E-07	5.01E-07	--	3.43E-08
Lead	xx	4.65E-08	3.71E-09	5.02E-08	--	3.44E-09
Magnesium	xx	xx	7.53E-08	7.53E-08	--	5.16E-09
Manganese	xx	xx	8.01E-09	8.01E-09	--	5.49E-10
Mercury	xx	3.37E-11	6.85E-13	3.44E-11	--	2.36E-12
Nickel	xx	8.91E-10	9.44E-10	1.83E-09	2.69E-11	1.26E-10
Potassium	xx	1.01E-07	1.85E-08	1.19E-07	--	8.16E-09
Selenium	xx	xx	1.54E-11	1.54E-11	--	1.06E-12
Silver	1.17E-07	5.20E-11	6.25E-12	1.17E-07	--	8.02E-09
Sodium	xx	2.74E-08	7.96E-09	3.53E-08	--	2.42E-09
Thallium	xx	xx	1.98E-09	1.98E-09	--	1.36E-10
Zinc	xx	2.29E-06	6.92E-08	2.36E-06	--	1.62E-07
135TNB	xx	1.51E-09	2.71E-11	1.54E-09	--	1.05E-10
246TNT	8.40E-08	3.80E-07	8.80E-10	4.65E-07	6.82E-09	3.18E-08
HMX	xx	xx	1.03E-10	1.03E-10	--	7.03E-12
RDX	1.04E-07	xx	4.44E-10	1.04E-07	1.53E-09	7.13E-09
24DNT	xx	xx	1.39E-11	1.39E-11	2.04E-13	9.50E-13
26DNT	xx	xx	1.04E-12	1.04E-12	1.52E-14	7.10E-14
Nitrobenzene	xx	1.22E-10 (c)	xx	1.22E-10	--	8.39E-12
Tetryl	xx	5.61E-11 (C)	xx	5.61E-11	--	3.84E-12
Nitrate/nitrite	1.22E-06	4.25E-10	7.49E-10 (c)	1.23E-06	--	8.40E-08

(a) - Concentration in air = Conc. in soil (mg/kg) x airborne dust conc (mg/m3) x 1E-06 (kg/mg). Soil concentration is the 95 percent upper confidence limit on the arithmetic mean of surface soil data (samples less than 2 feet deep). Non-detects are replaced with one-half the detection level for calculating the soil concentration. Airborne dust concentration were taken from Appendix E.

(b) - The exposure point concentration is the sum of site-specific airborne contaminant concentrations. The assumption is made that the contaminants are distributed in the air in the same proportion as they are in the surface soil.

(c) - The soil concentration used to calculate the concentration in air is the maximum detected concentration, which is less than the 95 percent upper confidence limit on the arithmetic mean.

"--" - Not calculated because contaminant is not considered a carcinogen or potency factor is not available.

"xx" - Not calculated since chemical was not identified as a contaminant of concern at this site.

* - Replaces original Table 6-39 in the Final Baseline RA; Dames & Moore, 1992a.

** - Site at which followup fieldwork was conducted

TABLE 6-40*

Estimated Contaminant Concentrations in Air and Estimated Human Intakes Due to Inhalation of Dust Current Land Use Scenario, Irrigon Residents

Analyte	Concentration in Air (mg/m3) (a) Site 16	Site 19**	Site 15**	Exposure Point Concentration (mg/m3)(b)	Carcinogenic Intake (mg/kg/day)	Noncarcinogenic Intake (mg/kg/day)
Airborne Dust	7.09E-03	1.97E-05	1.39E-06			
Aluminum	xx	2.49E-07	xx	2.49E-07	--	1.71E-08
Antimony	xx	1.75E-08	1.32E-09	1.88E-08	--	1.29E-09
Arsenic	xx	1.38E-09	1.25E-11	1.40E-09	2.05E-11	9.56E-11
Barium	3.03E-06	1.60E-07	3.25E-09	3.19E-06	--	2.18E-07
Beryllium	xx	xx	6.28E-12	6.28E-12	9.22E-14	4.30E-13
Cadmium	2.35E-08	3.61E-09	1.14E-09	2.82E-08	4.14E-10	1.93E-09
Chromium	xx	4.33E-10	2.84E-09	3.27E-09	4.80E-11	2.24E-10
Cobalt	1.35E-07	xx	1.09E-10	1.35E-07	--	9.23E-09
Copper	8.36E-07	6.24E-07	1.44E-09	1.46E-06	--	1.00E-07
Cyanide	8.08E-09	xx	xx	8.08E-09	--	5.53E-10
Iron	xx	xx	7.53E-08	7.53E-08	--	5.15E-09
Lead	xx	2.41E-08	5.57E-10	2.47E-08	--	1.69E-09
Magnesium	xx	xx	1.13E-08	1.13E-08	--	7.75E-10
Manganese	xx	xx	1.20E-09	1.20E-09	--	8.24E-11
Mercury	xx	1.75E-11	1.03E-13	1.76E-11	--	1.21E-12
Nickel	xx	4.63E-10	1.42E-10	6.05E-10	8.88E-12	4.14E-11
Potassium	xx	5.22E-08	2.78E-09	5.50E-08	--	3.77E-09
Selenium	xx	xx	2.32E-12	2.32E-12	--	1.59E-13
Silver	1.06E-08	2.70E-11	9.40E-13	1.06E-08	--	7.25E-10
Sodium	xx	1.42E-08	1.20E-09	1.54E-08	--	1.06E-09
Thallium	xx	xx	2.97E-10	2.97E-10	--	2.04E-11
Zinc	xx	1.19E-06	1.04E-08	1.20E-06	--	8.22E-08
135TNB	xx	7.84E-10	4.07E-12	7.88E-10	--	5.40E-11
246TNT	7.58E-09	1.97E-07	1.32E-10	2.05E-07	3.01E-09	1.40E-08
HMX	xx	xx	1.54E-11	1.54E-11	--	1.06E-12
RDX	9.36E-09	xx	6.67E-11	9.42E-09	1.38E-10	6.45E-10
24DNT	xx	xx	2.09E-12	2.09E-12	3.06E-14	1.43E-13
26DNT	xx	xx	1.56E-13	1.56E-13	2.28E-15	1.07E-14
Nitrobenzene	xx	6.36E-11 (c)	xx	6.36E-11	--	4.36E-12
Tetryl	xx	2.92E-11 (C)	xx	2.92E-11	--	2.00E-12
Nitrate/nitrite	1.11E-07	2.21E-10	1.13E-10 (c)	1.11E-07	--	7.60E-09

(a) - Concentration in air = Conc. in soil (mg/kg) x airborne dust conc (mg/m3) x 1E-06 (kg/mg). Soil concentration is the 95 percent upper confidence limit on the arithmetic mean of surface soil data (samples less than 2 feet deep). Non-detects are replaced with one-half the detection level for calculating the soil concentration. Airborne dust concentration were taken from Appendix E.

(b) - The exposure point concentration is the sum of site-specific airborne contaminant concentrations. The assumption is made that the contaminants are distributed in the air in the same proportion as they are in the surface soil.

(c) - The soil concentration used to calculate the concentration in air is the maximum detected concentration, which is less than the 95 percent upper confidence limit on the arithmetic mean.

"--" - Not calculated because contaminant is not considered a carcinogen or potency factor is not available.

"xx" - Not calculated since chemical was not identified as a contaminant of concern at this site.

* - Replaces original Table 6-40 in the Final Baseline RA; Dames & Moore, 1992a.

** - Site at which followup fieldwork was conducted.

inhalation of contaminated soil as airborne dust (pathway 3), the only pathway quantitatively evaluated for these receptors. For purposes of air modeling, the Irrigon residents are assumed to be located at a school in town. Concentrations of contaminants of concern in airborne dust from each of the three relevant sites--Site 16 and followup fieldwork Sites 15 and 19--are calculated according to Equation B provided in Table 6-14 of the Baseline RA, using the 95 percent UCL on the arithmetic mean of surface soil data (to a depth of 2 feet). These soil concentrations are obtained from occurrence and distribution tables presented in Section 3.0*. The site-specific airborne dust contaminant concentrations are then summed across the three sites to obtain exposure point concentrations for the offsite Irrigon residents.

6.5.2* Future Land Use Scenario

6.5.2.1* Operable Unit A: Explosive Washout Lagoons and Associated Buildings

6.5.2.1.2* Site 5: Explosive Washout Plant. Tables 6-51* through 6-54* present estimated exposure point concentrations and carcinogenic and noncarcinogenic intakes for dermal absorption of contaminants in soil (pathway 1), incidental soil ingestion (pathway 2), dust inhalation (pathway 3), and crop ingestion (pathway 12), respectively, for the future residential land use scenario at followup fieldwork Site 5.

The soil concentration used is the 95 percent UCL on the arithmetic mean of surface soil data (to a depth of 2 feet) for Site 5, obtained from Table 3-8*.

6.5.2.1.3* Site 36: Building 493 Paint Sludge Discharge Area. Tables 6-55* through 6-57* present estimated exposure point concentrations and carcinogenic and noncarcinogenic intakes for incidental soil ingestion (pathway 2), dust inhalation (pathway 3), and crop ingestion (pathway 12), respectively, for the future residential land use scenario at followup fieldwork Site 36.

The soil concentration used is the 95 percent UCL on the arithmetic mean of surface soil data (to a depth of 2 feet) for Site 36, obtained from Table 3-9*.

6.5.2.1.4* Site 47: Boiler/Laundry Effluent Discharge Site. Tables 6-58* through 6-60* present estimated exposure point concentrations and carcinogenic and

TABLE 6-51*

Estimated Contaminant Concentrations in Soil and Estimated Human Intakes Due to Dermal Absorption of the Contaminants in the Soil at Site 5 Future Residential Land Use Scenario

Analyte	Exposure Point Concentration (mg/kg)(a)	Dermal Absorption Factor (unitless)	Carcinogenic Intake (mg/kg/day)	Noncarcinogenic Intake (mg/kg/day)
135TNB	5.67	0.50	--	2.49E-04
13DNB	0.302	0.50	--	1.32E-05
246TNT	758	0.50	1.42E-02	3.32E-02
24DNT	0.824	0.50	1.55E-05	3.61E-05
HMX	17.6	0.50	--	7.72E-04
RDX	165	0.00	0.00E+00 (b)	0.00E+00 (b)
Tetryl	3.39	0.50	--	1.49E-04

(a) – Exposure point concentration is the 95 percent upper confidence limit on the arithmetic mean of surface soil data (samples less than 2 feet deep). Non-detects are replaced with one-half the detection level for calculating exposure point concentration.

(b) – Because RDX is not dermally absorbed, the carcinogenic and noncarcinogenic intakes are zero.

"--" – Not calculated because contaminant is not considered a carcinogen or potency factor is not available.

* – Replaces original Table 6-51 in the Final Baseline RA; Dames & Moore, 1992a.

TABLE 6-52*

Estimated Contaminant Concentrations in Soil and Estimated Human Intakes Due to Incidental Ingestion of Soil at Site 5 Future Residential Land Use Scenario

Analyte	Exposure Point Concentration (mg/kg)(a)	Carcinogenic Intake (mg/kg/day)	Noncarcinogenic Intake (mg/kg/day)
135TNB	5.67	--	2.07E-05
13DNB	0.302	--	1.10E-06
246TNT	758	1.19E-03	2.77E-03
24DNT	0.824	1.29E-06	3.01E-06
HMX	17.6	--	6.43E-05
RDX	165	2.58E-04	6.03E-04
Tetryl	3.39	--	1.24E-05
Nitrite/nitrate	8.3	--	3.03E-05

(a) – Exposure point concentration is the 95 percent upper confidence limit on the arithmetic mean of surface soil data (samples less than 2 feet deep). Non-detects are replaced with one-half the detection level for calculating exposure point concentration.

"--" – Not calculated because contaminant is not considered a carcinogen or potency factor is not available.

* – Replaces original Table 6-52 in the Final Baseline RA; Dames & Moore, 1992a.

TABLE 6-53*

Estimated Contaminant Concentrations in Air and Estimated Human Intakes Due to Inhalation of Dust at Site 5 Future Residential Land Use Scenario

Source-Related Dust Concentration for Site 5 is 0.000835 mg/m3 (see Appendix E)

Analyte	Concentration in Soil (mg/kg)(a)	Exposure Point Concentration (mg/m3)(b)	Carcinogenic Intake (mg/kg/day)	Noncarcinogenic Intake (mg/kg/day)
135TNB	5.67	4.73E-09	--	1.30E-09
13DNB	0.302	2.52E-10	--	6.91E-11
246TNT	758	6.33E-07	7.43E-08	1.73E-07
24DNT	0.824	6.88E-10	8.08E-11	1.89E-10
HMX	17.6	1.47E-08	--	4.03E-09
RDX	165	1.38E-07	1.62E-08	3.77E-08
Tetryl	3.39	2.83E-09	--	7.76E-10
Nitrite/nitrate	8.3	6.93E-09	--	1.90E-09

(a) - Concentration in soil is the 95 percent upper confidence limit on the arithmetic mean of surface soil data (samples less than 2 feet deep). Non-detects are replaced with one-half the detection level for calculating the soil concentration.

(b) - The exposure point concentration is the product of the total source-related dust concentration and the contaminant concentration in surface soil. The assumption is made that the contaminants are distributed in the air in the same proportion as they are in the surface soil.

* - Replaces original Table 6-53 in the Final Baseline RA; Dames & Moore, 1992a

TABLE 6-54*

Estimated Contaminant Concentrations in Crops and Estimated Human Intakes of Contaminants Due to Consumption of Crops at Site 5 Future Residential Land Use Scenario

Analyte	Concentration in Soil (a) (mg/kg)	Concentration in Water (b) (ug/l)	Concentration in Crops (mg/kg)	Carcinogenic Intake (mg/kg/day)	Noncarcinogenic Intake (mg/kg/day)
135TNB	5.67	NA	4.57E+01	--	5.00E-02
13DNB	0.302	NA	1.61E+00	--	1.76E-03
246TNT	758	NA	2.05E+03	9.63E-01	2.25E+00
24DNT	0.824	NA	2.29E+00	1.07E-03	2.51E-03
HMX	17.6	NA	4.82E+02	--	5.28E-01
RDX	165	NA	2.01E+03	9.43E-01	2.20E+00
Tetryl	3.39	NA	1.46E+01	--	1.60E-02
Nitrate/nitrite	8.3	NA	xx	--	xx

(a) Concentration in soil is the 95 percent upper confidence limit on the arithmetic mean of surface soil data (samples less than 2 feet deep). Non-detects are replaced with one-half the detection level for calculating the soil concentration.

(b) Concentration in groundwater is the 95 percent upper confidence limit on the arithmetic mean of groundwater data. Non-detects are replaced with one-half the detection level for calculating the groundwater concentration.

"--" – Not calculated because contaminant is not considered a carcinogen or potency factor is not available.

"xx" – Quantitative information on uptake factors not available.

"ND" – Not detected

"NA" – Not applicable because groundwater samples were not collected at this site.

* – Replaces original Table 6-54 in the Final Baseline RA; Dames & Moore, 1992a.

TABLE 6-55*

Estimated Contaminant Concentrations in Soil and Estimated Human Intakes Due to Incidental Ingestion of Soil at Site 36 Future Residential Land Use Scenario

Analyte	Exposure Point Concentration (mg/kg)(a)	Carcinogenic Intake (mg/kg/day)	Noncarcinogenic Intake (mg/kg/day)
Cadmium	216	--	7.89E-04
Chromium	63	--	2.30E-04
Cobalt	11.5	--	4.20E-05
Copper	51.1	--	1.87E-04
Iron	22210	--	8.11E-02
Lead	139	--	5.08E-04
Nickel	17.7	--	6.47E-05
Silver	0.315	--	1.15E-06
Zinc	707	--	2.58E-03
Nitrite/nitrate	8.22	--	3.00E-05

(a) – Exposure point concentration is the 95 percent upper confidence limit on the arithmetic mean of surface soil data (samples less than 2 feet deep). Non-detects are replaced with one-half the detection level for calculating exposure point concentration.

"--" – Not calculated because contaminant is not considered a carcinogen or potency factor is not available.

* – Replaces original Table 6-55 in the Final Baseline RA; Dames & Moore, 1992a.

TABLE 6-56*

Estimated Contaminant Concentrations in Air and Estimated Human Intakes Due to Inhalation of Dust at Site 36 Future Residential Land Use Scenario

Source-Related Dust Concentration for Site 36 is 0.000767 mg/m3 (see Appendix E)

Analyte	Concentration in Soil (mg/kg)(a)	Exposure Point Concentration (mg/m3)(b)	Carcinogenic Intake (mg/kg/day)	Noncarcinogenic Intake (mg/kg/day)
Cadmium	216	1.66E-07	1.95E-08	4.54E-08
Chromium	63	4.83E-08	5.67E-09	1.32E-08
Cobalt	11.5	8.82E-09	--	2.42E-09
Copper	51.1	3.92E-08	--	1.07E-08
Iron	22210	1.70E-05	--	4.67E-06
Lead	139	1.07E-07	--	2.92E-08
Nickel	17.7	1.36E-08	1.59E-09	3.72E-09
Silver	0.315	2.42E-10	--	6.62E-11
Zinc	707	5.42E-07	--	1.49E-07
Nitrite/nitrate	8.22	6.30E-09	--	1.73E-09

(a) - Concentration in soil is the 95 percent upper confidence limit on the arithmetic mean of surface soil data (samples less than 2 feet deep). Non-detects are replaced with one-half the detection level for calculating the soil concentration.

(b) - The exposure point concentration is the product of the total source-related dust concentration and the contaminant concentration in surface soil. The assumption is made that the contaminants are distributed in the air in the same proportion as they are in the surface soil.

"--" - Not calculated because contaminant is not considered a carcinogen or potency factor is not available.

* - Replaces original Table 6-56 in the Final Baseline RA; Dames & Moore, 1992a.

TABLE 6-57*

Estimated Contaminant Concentrations in Crops and Estimated Human Intakes of Contaminants Due to Consumption of Crops at Site 36 Future Residential Land Use Scenario

Analyte	Concentration in Soil (a) (mg/kg)	Concentration in Water (b) (ug/l)	Concentration in Crops (mg/kg)	Carcinogenic Intake (mg/kg/day)	Noncarcinogenic Intake (mg/kg/day)
Cadmium	216	NA	1.30E+01	--	1.42E-02
Chromium	63	NA	6.30E-02	--	6.90E-05
Cobalt	11.5	NA	xx	--	xx
Copper	51.1	NA	xx	--	xx
Iron	22210	NA	xx	--	xx
Lead	139	NA	6.95E-01	--	7.62E-04
Nickel	17.7	NA	8.85E-01	--	9.70E-04
Silver	0.315	NA	xx	--	xx
Zinc	707	NA	xx	--	xx
Nitrite/nitrate	8.22	NA	xx	--	xx

(a) Concentration in soil is the 95 percent upper confidence limit on the arithmetic mean of surface soil data (samples less than 2 feet deep). Non-detects are replaced with one-half the detection level for calculating the soil concentration.

(b) Concentration in groundwater is the 95 percent upper confidence limit on the arithmetic mean of groundwater data. Non-detects are replaced with one-half the detection level for calculating the groundwater concentration.

"--" – Not calculated because contaminant is not considered a carcinogen or potency factor is not available.

"xx" – Quantitative information on uptake factors not available.

"ND" – Not detected.

"NA" – Not applicable because groundwater samples were not collected at this site.

* – Replaces original Table 6-57 in the Final Baseline RA; Dames & Moore, 1992a.

TABLE 6-58*

Estimated Contaminant Concentrations in Soil and Estimated Human Intakes Due to Dermal Absorption of Contaminants in Soil at Site 47 Future Residential Land Use Scenario

Analyte	Exposure Point Concentration (mg/kg)(a)	Dermal Absorption Factor (unitless)	Carcinogenic Intake (mg/kg/day)	Noncarcinogenic Intake (mg/kg/day)
PCB-1260	0.336	0.06	7.57E-07	1.77E-06

(a) - Unless otherwise noted, the exposure point concentration is the 95 percent upper confidence limit on the arithmetic mean of surface soil data (samples less than 2 feet deep). Non-detects are replaced with one-half the detection level for calculating exposure point concentration.

* - Replaces original Table 6-58 in the Final Baseline RA; Dames & Moore, 1992a.

TABLE 6-59*

Estimated Contaminant Concentrations in Soil and Estimated Human Intakes Due to Incidental Ingestion of Soil at Site 47 Future Residential Land Use Scenario

Analyte	Exposure Point Concentration (mg/kg)(a)	Carcinogenic Intake (mg/kg/day)	Noncarcinogenic Intake (mg/kg/day)
Antimony	151	--	5.52E-04
Barium	470	--	1.72E-03
Cadmium	23.3	--	8.51E-05
Calcium	73240	--	2.68E-01
Chromium	40	--	1.46E-04
Copper	264	--	9.64E-04
Lead	428	--	1.56E-03
Magnesium	15950	--	5.83E-02
Mercury	0.559	--	2.04E-06
Nickel	47.1	--	1.72E-04
Selenium	0.261	--	9.53E-07
Silver	0.638	--	2.33E-06
Sodium	927	--	3.39E-03
Zinc	961	--	3.51E-03
Nitrite/nitrate	18.6	--	6.79E-05
Benzo(a)anthracene	0.249 (b)	3.90E-07	9.10E-07
Benzo(b)fluoranthene	0.449 (b)	7.03E-07	1.64E-06
Benzo(k)fluoranthene	0.23 (b)	3.60E-07	8.40E-07
Chrysene	0.481 (b)	7.53E-07	1.76E-06
Di-n-butyl phthalate	0.813	--	2.97E-06
Fluoranthene	0.294 (b)	--	1.07E-06
Phenanthrene	0.093 (b)	--	3.40E-07
Pyrene	0.325 (b)	--	1.19E-06
Chlordane	0.303	4.74E-07	1.11E-06
DDD	0.176	2.76E-07	6.43E-07
DDE	0.007	1.10E-08	2.56E-08
DDT	0.067	1.05E-07	2.45E-07
Dieldrin	0.007	1.10E-08	2.56E-08
PCB-1260	0.336	5.26E-07	1.23E-06

(a) – Unless otherwise noted, the exposure point concentration is the 95 percent upper confidence limit on the arithmetic mean of surface soil data (samples less than 2 feet deep). Non-detects are replaced with one-half the detection level for calculating exposure point concentration.

(b) – The 95 percent upper confidence limit on the arithmetic mean exceeds the maximum detected concentration; therefore, the maximum detected concentration is used as the exposure point concentration.

"--" Not calculated because contaminant is not considered a carcinogen or potency factor is not available.

* – Replaces original Table 6-59 in the Final Baseline RA; Dames & Moore, 1992a.

TABLE 6-60*

Estimated Contaminant Concentrations in Air and Estimated Human Intakes Due to Inhalation of Dust at Site 47 Future Residential Land Use Scenario

Source-Related Dust Concentration for Site 47 is 0.000839 mg/m3 (see Appendix E)

Analyte	Concentration in Soil (mg/kg)(a)	Exposure Point Concentration (mg/m3)(c)	Carcinogenic Intake (mg/kg/day)	Noncarcinogenic Intake (mg/kg/day)
Antimony	151	1.27E-07	--	3.47E-08
Barium	470	3.94E-07	--	1.08E-07
Cadmium	23.3	1.95E-08	2.30E-09	5.36E-09
Calcium	73240	6.14E-05	--	1.68E-05
Chromium	40	3.36E-08	3.94E-09	9.19E-09
Copper	264	2.21E-07	--	6.07E-08
Lead	428	3.59E-07	--	9.84E-08
Magnesium	15950	1.34E-05	--	3.67E-06
Mercury	0.559	4.69E-10	--	1.28E-10
Nickel	47.1	3.95E-08	4.64E-09	1.08E-08
Selenium	0.261	2.19E-10	--	6.00E-11
Silver	0.638	5.35E-10	--	1.47E-10
Sodium	927	7.78E-07	--	2.13E-07
Zinc	961	8.06E-07	--	2.21E-07
Nitrite/nitrate	18.6	1.56E-08	--	4.28E-09
Benzo(a)anthracene	0.249 (b)	2.09E-10	2.45E-11	5.72E-11
Benzo(b)fluoranthene	0.449 (b)	3.77E-10	4.42E-11	1.03E-10
Benzo(k)fluoranthene	0.23 (b)	1.93E-10	2.27E-11	5.29E-11
Chrysene	0.481 (b)	4.04E-10	4.74E-11	1.11E-10
Di-n-butyl phthalate	0.813	6.82E-10	--	1.87E-10
Fluoranthene	0.294 (b)	2.47E-10	--	6.76E-11
Phenanthrene	0.093 (b)	7.80E-11	--	2.14E-11
Pyrene	0.325 (b)	2.73E-10	--	7.47E-11
Chlordane	0.303	2.54E-10	2.98E-11	6.96E-11
DDD	0.176	1.48E-10	1.73E-11	4.05E-11
DDE	0.007	5.87E-12	6.90E-13	1.61E-12
DDT	0.067	5.62E-11	6.60E-12	1.54E-11
Dieldrin	0.007	5.87E-12	6.90E-13	1.61E-12
PCB-1260	0.336	2.82E-10	3.31E-11	7.72E-11

(a) - Unless otherwise noted, the concentration in soil is the 95 percent upper confidence limit on the arithmetic mean of surface soil data (samples less than 2 feet deep). Non-detects are replaced with one-half the detection level for calculating the soil concentration.

(b) - The 95 percent upper confidence limit on the arithmetic mean exceeds the maximum detected concentration; therefore, the maximum detected concentration is used as the soil concentration.

(c) - The exposure point concentration is the product of the total source-related dust concentration and the contaminant concentration in surface soil. The assumption is made that the contaminants are distributed in the air in the same proportion as they are in the surface soil.

"--" - Not calculated because contaminant is not considered a carcinogen or potency factor is not available.

* - Replaces original Table 6-60 in the Final Baseline RA; Dames & Moore, 1992a.

noncarcinogenic intakes for dermal absorption of contaminants in soil (pathway 1), incidental soil ingestion (pathway 2), and dust inhalation (pathway 3), respectively, for the future residential land use scenario at followup fieldwork Site 47.

The soil concentration used is the 95 percent UCL on the arithmetic mean of surface soil data (to a depth of 2 feet) for Site 47, obtained from Table 3-10*.

As discussed in Section 3.0*, no additional groundwater sampling was conducted at Site 47 during followup fieldwork; therefore, the exposure point concentrations and carcinogenic and noncarcinogenic intakes for groundwater ingestion (pathway 5), inhalation of VOCs emitted from groundwater (pathway 6), and dermal absorption of contaminants in groundwater (pathway 7) are unchanged from those discussed in Section 6.5.2.1.4 of the Baseline RA.

Table 6-61* presents the estimated soil concentration, groundwater concentration, crop concentration, and carcinogenic and noncarcinogenic intakes for crop ingestion (pathway 12) for the flood gravel aquifer for the future residential land use scenario at Site 47.

The soil concentration used is the 95 percent UCL on the arithmetic mean of surface soil data (to a depth of 2 feet) for Site 47, obtained from Table 3-10*. The groundwater concentration used is the 95 percent UCL on the arithmetic mean of groundwater data from the flood gravel aquifer, obtained from Table 3-4 in the Baseline RA.

Table 6-62* presents the estimated soil concentration, groundwater concentration, crop concentration, and carcinogenic and noncarcinogenic intakes for crop ingestion (pathway 12) for the basalt aquifer for the future residential land use scenario at Site 47.

The soil concentration used is the 95 percent UCL on the arithmetic mean of surface soil data (to a depth of 2 feet) for Site 47, obtained from Table 3-10*. The groundwater concentration used is the 95 percent UCL on the arithmetic mean of

TABLE 6-61*

Estimated Contaminant Concentrations in Crops and Estimated Human Intakes of Contaminants Due to Consumption of Crops at Site 47--Flood Gravel Aquifer Future Residential Land Use Scenario

Analyte	Concentration in Soil (a) (mg/kg)	Concentration in Water (b) (ug/l)	Concentration in Crops (mg/kg)	Carcinogenic Intake (mg/kg/day)	Noncarcinogenic Intake (mg/kg/day)
Antimony	151	2.9	xx	--	xx
Arsenic	1.8	15	7.26E-03	3.41E-06	7.96E-06
Barium	470	35.5	xx	--	xx
Beryllium	0.576 (c)	0.5 (c)	5.77E-04	2.71E-07	6.32E-07
Cadmium	23.3	ND	1.40E+00	--	1.53E-03
Calcium	73240	49892	xx	--	xx
Chromium	40	11	4.00E-02	--	4.38E-05
Copper	264	7.16	xx	--	xx
Lead	428	5.84	2.14E+00	--	2.35E-03
Magnesium	15950	22433	xx	--	xx
Mercury	0.559	0.203	5.03E-02	--	5.52E-05
Nickel	47.1	17.6	2.36E+00	--	2.58E-03
Selenium	0.261	ND	xx	--	xx
Silver	0.638	0.167	xx	--	xx
Sodium	927	46347	xx	--	xx
Vanadium	77.7	81.3	xx	--	xx
Zinc	961	38.4	xx	--	xx
Nitrite/nitrate	18.6	16885	xx	--	xx
135TNB	ND	47.1	1.64E-01	--	1.80E-04
13DNB	ND	1.37	4.60E-03	--	5.05E-06
246TNT	ND	418	1.33E+00	6.24E-04	1.46E-03
24DNT	ND	49.8	1.59E-01	7.45E-05	1.74E-04
26DNT	ND	0.662	2.13E-03	1.00E-06	2.33E-06
HMX	ND	160	6.16E-01	--	6.75E-04
RDX	ND	729	2.62E+00	1.23E-03	2.88E-03
Nitrobenzene	ND	1.48	4.78E-03	--	5.24E-06
Tetryl	ND	0.468	1.55E-03	--	1.69E-06
Trichloroethylene	ND	0.908	2.79E-03	1.31E-06	3.06E-06
Benzo(a)anthracene	0.249 (c)	ND	8.32E-03	3.91E-06	9.12E-06
Benzo(b)fluoranthene	0.449 (c)	ND	5.60E-03	2.63E-06	6.14E-06
Benzo(k)fluoranthene	0.23 (c)	ND	9.92E-04	4.66E-07	1.09E-06
Chrysene	0.481 (c)	ND	1.06E-02	4.99E-06	1.16E-05
Di-n-butyl phthalate	0.813	ND	1.83E-02	--	2.00E-05
Fluoranthene	0.294 (c)	ND	9.45E-03	--	1.04E-05
Phenanthrene	0.093 (c)	ND	9.52E-03	--	1.04E-05
Pyrene	0.325 (c)	ND	1.84E-02	8.66E-06	2.02E-05
Chlordane	0.303	ND	7.37E-03	3.46E-06	8.07E-06
DDD	0.176	ND	4.17E-03	1.96E-06	4.57E-06
DDE	0.007	ND	1.39E-04	6.55E-08	1.53E-07
DDT	0.067	ND	5.47E-04	2.57E-07	6.00E-07
Dieldrin	0.007	ND	5.72E-05	2.68E-08	6.26E-08
PCB-1260	0.336	ND	3.99E-03	1.87E-06	4.37E-06

(a) - Unless otherwise noted, the concentration in soil is the 95 percent upper confidence limit on the arithmetic mean of surface soil data (samples less than 2 feet deep). Non-detects are replaced with one-half the detection level for calculating the soil concentration.

(b) - Unless otherwise noted, the groundwater concentration is the 95 percent upper confidence limit on the arithmetic mean of groundwater data. Non-detects are replaced with one-half the detection level for calculating exposure point concentration.

(c) - The 95 percent upper confidence limit on the arithmetic mean exceeds the maximum detected concentration; therefore, the maximum detected concentration is used.

"--" - Not calculated because contaminant is not considered a carcinogen or potency factor is not available.

"xx" - Quantitative information on uptake factors not available.

"ND" - Not detected

"NA" - Not analyzed

* - Replaces original Table 6-61 in the Final Baseline RA; Dames & Moore, 1992a.

TABLE 6-62*

Estimated Contaminant Concentrations in Crops and Estimated Human Intakes of Contaminants Due to Consumption of Crops at Site 47--Basalt Aquifer Future Residential Land Use Scenario

Analyte	Concentration in Soil (a) (mg/kg)	Concentration in Water (c) (ug/l)	Concentration in Crops (mg/kg)	Carcinogenic Intake (mg/kg/day)	Noncarcinogenic Intake (mg/kg/day)
Antimony	151	3.57	xx	--	xx
Barium	470	32.9	xx	--	xx
Cadmium	23.3	ND	1.40E+00	--	1.53E-03
Calcium	73240	38112	xx	--	xx
Chromium	40	ND	4.00E-02	--	4.38E-05
Copper	264	ND	xx	--	xx
Lead	428	3.04	2.14E+00	--	2.35E-03
Magnesium	15950	19059	xx	--	xx
Mercury	0.559	ND	5.03E-02	--	5.51E-05
Nickel	47.1	ND	2.36E+00	--	2.58E-03
Selenium	0.261	ND	xx	--	xx
Silver	0.638	ND	xx	--	xx
Sodium	927	85340	xx	--	xx
Zinc	961	21.7	xx	--	xx
Nitrite/nitrate	18.6	18329	xx	--	xx
135TNB	ND	14.5	5.04E-02	--	5.53E-05
13DNB	ND	0.474	1.59E-03	--	1.75E-06
246TNT	ND	142	4.51E-01	2.12E-04	4.94E-04
24DNT	ND	22	7.00E-02	3.29E-05	7.68E-05
HMX	ND	128	4.93E-01	--	5.40E-04
RDX	ND	1900	6.84E+00	3.21E-03	7.49E-03
Benzo(a)anthracene	0.249 (b)	ND	5.50E-03	2.58E-06	6.02E-06
Benzo(b)fluoranthene	0.449 (b)	ND	5.60E-03	2.63E-06	6.14E-06
Benzo(k)fluoranthene	0.23 (b)	ND	9.92E-04	4.66E-07	1.09E-06
Chrysene	0.481 (b)	ND	1.06E-02	4.99E-06	1.16E-05
Di-n-butyl phthalate	0.813	ND	1.83E-02	--	2.00E-05
Fluoranthene	0.294 (b)	ND	9.45E-03	--	1.04E-05
Phenanthrene	0.093 (b)	ND	9.52E-03	--	1.04E-05
Pyrene	0.325 (b)	ND	1.84E-02	--	2.02E-05
Chlordane	0.303	ND	7.37E-03	3.46E-06	8.07E-06
DDD	0.176	ND	4.17E-03	1.96E-06	4.57E-06
DDE	0.007	ND	1.39E-04	6.55E-08	1.53E-07
DDT	0.067	ND	5.47E-04	2.57E-07	6.00E-07
Dieldrin	0.007	ND	7.76E-04	3.65E-07	8.51E-07
PCB-1260	0.336	ND	3.99E-03	1.87E-06	4.37E-06

(a) - Unless otherwise noted, the concentration in soil is the 95 percent upper confidence limit on the arithmetic mean of surface soil data (samples less than 2 feet deep). Non-detects are replaced with one-half the detection level for calculating the soil concentration.
(b) - The 95 percent upper confidence limit on the arithmetic mean exceeds the maximum detected concentration; therefore, the maximum detected concentration is used.
(c) - Concentration in groundwater is the 95 percent upper confidence limit on the arithmetic mean of groundwater data. Non-detects are replaced with one-half the detection level for calculating the groundwater concentration.
"--" - Not calculated because contaminant is not considered a carcinogen or potency factor is not available.
"xx" - Quantitative information on uptake factors not available.
"ND" - Not detected
"NA" - Not analyzed
* - Replaces original Table 6-62 in the Final Baseline RA; Dames & Moore, 1992a.

groundwater data from the basalt aquifer, obtained from Table 3-5 in the Baseline RA.

6.5.2.2* Operable Unit B: Ammunition Demolition Activity Area

6.5.2.2.4* Site 15: TNT Sludge Burial and Burn Area. Tables 6-81* through 6-83* present estimated exposure point concentrations and carcinogenic and noncarcinogenic intakes for dermal absorption of contaminants in soil (pathway 1), incidental soil ingestion (pathway 2), and dust inhalation (pathway 3), respectively, for the future residential land use scenario at followup fieldwork Site 15. Table 6-84 in the Baseline RA, which presents exposure point concentrations and carcinogenic and noncarcinogenic intakes for groundwater ingestion (pathway 5) for the future residential land use scenario at Site 55 and followup fieldwork Site 15, is not affected by the followup fieldwork. Table 6-85* presents the estimated soil concentration, groundwater concentration, crop concentration, and carcinogenic and noncarcinogenic intakes for crop ingestion (pathway 12) for the future residential land use scenario at Site 15. Table 6-86* presents estimated exposure point concentrations and carcinogenic and noncarcinogenic intakes for dust inhalation (pathway 3) for the future military (tank training) land use scenario at Site 15.

The soil concentration used is the 95 percent UCL on the arithmetic mean of surface soil data (to a depth of 2 feet) for Site 15, obtained from Table 3-22*. The groundwater concentration used is the 95 percent UCL on the arithmetic mean of groundwater data for Site 15, obtained from Table 3-21 in the Baseline RA.

6.5.2.2.6* Site 17: Aboveground OD Area. Tables 6-93* through 6-96* present estimated exposure point concentrations and carcinogenic and noncarcinogenic intakes for dermal absorption of contaminants in soil (pathway 1), incidental soil ingestion (pathway 2), dust inhalation (pathway 3), and crop ingestion (pathway 12), respectively, for the future residential land use scenario at followup fieldwork Site 17. Table 6-97* presents estimated exposure point concentrations and carcinogenic and noncarcinogenic intakes for dust inhalation (pathway 3) for the future military (tank training) land use scenario at Site 17.

TABLE 6-81*

Estimated Contaminant Concentrations in Soil and Estimated Human Intakes Due to Dermal Absorption of Contaminants in Soil at Site 15 Future Residential Land Use Scenario

Analyte	Exposure Point Concentration (mg/kg)(a)	Dermal Absorption Factor (unitless)	Carcinogenic Intake (mg/kg/day)	Noncarcinogenic Intake (mg/kg/day)
135TNB	2.93	0.50	--	1.28E-04
246TNT	95.1	0.50	1.79E-03	4.17E-03
HMX	11.1	0.50	--	4.87E-04
RDX	48	0.00	0.00E+00 (b)	0.00E+00 (b)
24DNT	1.5	0.50	2.82E-05	6.58E-05
26DNT	0.112	0.50	2.10E-06	4.91E-06

(a) – Exposure point concentration is the 95 percent upper confidence limit on the arithmetic mean of surface soil data (samples less than 2 feet deep). Non-detects are replaced with one-half the detection level for calculating exposure point concentration.

(b) – Because RDX is not dermally absorbed, the carcinogenic and noncarcinogenic intakes are zero.

"--" – Not calculated because contaminant is not considered a carcinogen or potency factor is not available.

* – Replaces original Table 6-81 in the Final Baseline RA; Dames & Moore, 1992a.

TABLE 6-82*

Estimated Contaminant Concentrations in Soil and Estimated Human Intakes Due to Incidental Ingestion of Soil at Site 15 Future Residential Land Use Scenario

Analyte	Exposure Point Concentration (mg/kg)(a)	Carcinogenic Intake (mg/kg/day)	Noncarcinogenic Intake (mg/kg/day)
Antimony	947	--	3.46E-03
Arsenic	9.01	1.41E-05	3.29E-05
Barium	2335	--	8.53E-03
Beryllium	4.52	7.08E-06	1.65E-05
Cadmium	817	--	2.98E-03
Chromium	2042	--	7.46E-03
Cobalt	78.3	--	2.86E-04
Copper	1035	--	3.78E-03
Iron	54140	--	1.98E-01
Lead	401	--	1.46E-03
Magnesium	8143	--	2.97E-02
Manganese	866	--	3.16E-03
Mercury	0.074	--	2.70E-07
Nickel	102	--	3.73E-04
Potassium	2003	--	7.32E-03
Selenium	1.67	--	6.10E-06
Silver	0.676	--	2.47E-06
Sodium	861	--	3.15E-03
Thallium	214	--	7.82E-04
Zinc	7482	--	2.73E-02
135TNB	2.93	--	1.07E-05
246TNT	95.1	1.49E-04	3.47E-04
HMX	11.1	--	4.05E-05
RDX	48	7.51E-05	1.75E-04
24DNT	1.5	2.35E-06	5.48E-06
26DNT	0.112	1.75E-07	4.09E-07
Nitrite/nitrate	81 (b)	--	2.96E-04

(a) – Unless otherwise noted, the exposure point concentration is the 95 percent upper confidence limit on the arithmetic mean of surface soil data (samples less than 2 feet deep). Non-detects are replaced with one-half the detection level for calculating exposure point concentration.

(b) – The 95 percent upper confidence limit on the arithmetic mean exceeds the maximum detected concentration; therefore, the maximum detected concentration is used as the exposure point concentration.

"--" – Not calculated because contaminant is not considered a carcinogen or potency factor is not available.

* – Replaces original Table 6-82 in the Final Baseline RA; Dames & Moore, 1992a.

TABLE 6-83*

Estimated Contaminant Concentrations in Air and Estimated Human Intakes Due to Inhalation of Dust at Site 15 Future Residential Land Use Scenario

Source-Related Dust Concentration for Site 15 is 0.00345 mg/m3 (see Appendix E)

Analyte	Concentration in Soil (mg/kg)(a)	Exposure Point Concentration (mg/m3)(b)	Carcinogenic Intake (mg/kg/day)	Noncarcinogenic Intake (mg/kg/day)
Antimony	947	3.27E-06	--	8.95E-07
Arsenic	9.01	3.11E-08	3.65E-09	8.52E-09
Barium	2335	8.06E-06	--	2.21E-06
Beryllium	4.52	1.56E-08	1.83E-09	4.27E-09
Cadmium	817	2.82E-06	3.31E-07	7.72E-07
Chromium	2042	7.04E-06	8.27E-07	1.93E-06
Cobalt	78.3	2.70E-07	--	7.40E-08
Copper	1035	3.57E-06	--	9.78E-07
Iron	54140	1.87E-04	--	5.12E-05
Lead	401	1.38E-06	--	3.79E-07
Magnesium	8143	2.81E-05	--	7.70E-06
Manganese	866	2.99E-06	--	8.19E-07
Mercury	0.074	2.55E-10	--	6.99E-11
Nickel	102	3.52E-07	4.13E-08	9.64E-08
Potassium	2003	6.91E-06	--	1.89E-06
Selenium	1.67	5.76E-09	--	1.58E-09
Silver	0.676	2.33E-09	--	6.39E-10
Sodium	861	2.97E-06	--	8.14E-07
Thallium	214	7.38E-07	--	2.02E-07
Zinc	7482	2.58E-05	--	7.07E-06
135TNB	2.93	1.01E-08	--	2.77E-09
246TNT	95.1	3.28E-07	3.85E-08	8.99E-08
HMX	11.1	3.83E-08	--	1.05E-08
RDX	48	1.66E-07	1.94E-08	4.54E-08
24DNT	1.5	5.18E-09	6.08E-10	1.42E-09
26DNT	0.112	3.86E-10	4.54E-11	1.06E-10
Nitrite/nitrate	81 (c)	2.79E-07	--	7.66E-08

(a) - Unless otherwise noted, the concentration in soil is the 95 percent upper confidence limit on the arithmetic mean of surface soil data (samples less than 2 feet deep). Non-detects are replaced with one-half the detection level for calculating the soil concentration.

(b) - The exposure point concentration is the product of the total source-related dust concentration and the contaminant concentration in surface soil. The assumption is made that the contaminants are distributed in the air in the same proportion as they are in the surface soil.

(c) - The 95 percent upper confidence limit on the arithmetic mean exceeds the maximum detected concentration; therefore, the maximum detected concentration is used.

"--" - Not calculated because contaminant is not considered a carcinogen or potency factor is not available.

* - Replaces original Table 6-83 in the Baseline RA; Dames & Moore, 1992a.

TABLE 6-85*

Estimated Contaminant Concentrations in Crops and Estimated Human Intakes of Contaminants Due to Consumption of Crops at Site 15 Future Residential Land Use Scenario

Analyte	Concentration in Soil (a) (mg/kg)	Concentration in Water (b) (ug/l)	Concentration in Crops (mg/kg)	Carcinogenic Intake (mg/kg/day)	Noncarcinogenic Intake (mg/kg/day)
Antimony	947	3.13 (c)	xx	--	xx
Arsenic	9.01	17 (c)	3.60E-02	1.69E-05	3.95E-05
Barium	2335	104 (c)	xx	--	xx
Beryllium	4.52	ND	4.52E-03	2.12E-06	4.95E-06
Cadmium	817	ND	4.90E+01	--	5.37E-02
Chromium	2042	ND	2.04E+00	--	2.24E-03
Cobalt	78.3	ND	xx	--	xx
Copper	1035	ND	xx	--	xx
Iron	54140	ND	xx	--	xx
Lead	401	ND	2.01E+00	--	2.20E-03
Magnesium	8143	16599 (c)	xx	--	xx
Manganese	866	238 (c)	xx	--	xx
Mercury	0.074	ND	6.66E-03	--	7.30E-06
Nickel	102	ND	5.10E+00	--	5.59E-03
Potassium	2003	5516 (c)	xx	--	xx
Selenium	1.67	ND	xx	--	xx
Silver	0.676	ND	xx	--	xx
Sodium	861	97484 (c)	xx	--	xx
Thallium	214	ND	xx	--	xx
Zinc	7482	71.2 (c)	xx	--	xx
135TNB	2.93	ND	2.36E+01	--	2.59E-02
246TNT	95.1	ND	2.57E+02	1.21E-01	2.82E-01
HMX	11.1	ND	3.04E+02	--	3.33E-01
RDX	48	ND	5.84E+02	2.74E-01	6.40E-01
24DNT	1.5	ND	4.17E+00	1.96E-03	4.56E-03
26DNT	0.112	ND	3.51E-01	1.65E-04	3.84E-04
Nitrite/nitrate	81 (c)	46.5 (c)	xx	--	xx

(a) Unless otherwise noted, the concentration in soil is the 95 percent upper confidence limit on the arithmetic mean of surface soil data (samples less than 2 feet deep). Non-detects are replaced with one-half the detection level for calculating the soil concentration.

(b) Unless otherwise noted, the concentration in groundwater is the 95 percent upper confidence limit on the arithmetic mean of groundwater data. Non-detects are replaced with one-half the detection level for calculating the groundwater concentration.

(c) – The 95 percent upper confidence limit on the arithmetic mean exceeds the maximum detected concentration; therefore, the maximum detected concentration is used.

"--" – Not calculated because contaminant is not considered a carcinogen or potency factor is not available.

"xx" – Quantitative information on uptake factors not available.

"ND" – Not detected

* – Replaces original Table 6-85 in the Final Baseline RA; Dames & Moore, 1992a.

TABLE 6-86*

Estimated Contaminant Concentrations in Air and Estimated Human Intakes Due to Inhalation of Dust at Site 15 Future Military Land Use Scenario

Source-Related Dust Concentration for Site 15 is 0.103 mg/m3 (see Appendix E)

Analyte	Concentration in Soil (mg/kg)(a)	Exposure Point Concentration (mg/m3)(b)	Carcinogenic Intake (mg/kg/day)	Noncarcinogenic Intake (mg/kg/day)
Antimony	947	9.75E-05	--	1.78E-05
Arsenic	9.01	9.28E-07	7.26E-09	1.70E-07
Barium	2335	2.41E-04	--	4.39E-05
Beryllium	4.52	4.66E-07	3.64E-09	8.50E-08
Cadmium	817	8.42E-05	6.59E-07	1.54E-05
Chromium	2042	2.10E-04	1.65E-06	3.84E-05
Cobalt	78.3	8.06E-06	--	1.47E-06
Copper	1035	1.07E-04	--	1.95E-05
Iron	54140	5.58E-03	--	1.02E-03
Lead	401	4.13E-05	--	7.54E-06
Magnesium	8143	8.39E-04	--	1.53E-04
Manganese	866	8.92E-05	--	1.63E-05
Mercury	0.074	7.62E-09	--	1.39E-09
Nickel	102	1.05E-05	8.22E-08	1.92E-06
Potassium	2003	2.06E-04	--	3.77E-05
Selenium	1.67	1.72E-07	--	3.14E-08
Silver	0.676	6.96E-08	--	1.27E-08
Sodium	861	8.87E-05	--	1.62E-05
Thallium	214	2.20E-05	--	4.03E-06
Zinc	7482	7.71E-04	--	1.41E-04
135TNB	2.93	3.02E-07	--	5.51E-08
246TNT	95.1	9.80E-06	7.67E-08	1.79E-06
HMX	11.1	1.14E-06	--	2.09E-07
RDX	48	4.94E-06	3.87E-08	9.03E-07
24DNT	1.5	1.55E-07	1.21E-09	2.82E-08
26DNT	0.112	1.15E-08	9.03E-11	2.11E-09
Nitrite/nitrate	81 (b)	8.34E-06	--	1.52E-06

(a) – Unless otherwise noted, the concentration in soil is the 95 percent upper confidence limit on the arithmetic mean of surface soil data (samples less than 2 feet deep). Non-detects are replaced with one-half the detection level for calculating the soil concentration.

(b) – The exposure point concentration is the product of the total source-related dust concentration and the contaminant concentration in surface soil. The assumption is made that the contaminants are distributed in the air in the same proportion as they are in the surface soil.

(c) – The 95 percent upper confidence limit on the arithmetic mean exceeds the maximum detected concentration; therefore, the maximum detected concentration is used.

"--" – Not calculated because contaminant is not considered a carcinogen or potency factor is not available.

* – Replaces original Table 6-86 in the Final Baseline RA; Dames & Moore, 1992a.

TABLE 6-93*

Estimated Contaminant Concentrations in Soil and Estimated Human Intakes Due to Dermal Absorption of Contaminants in Soil at Site 17 Future Residential Land Use Scenario

Analyte	Exposure Point Concentration (mg/kg)(a)	Dermal Absorption Factor (unitless)	Carcinogenic Intake (mg/kg/day)	Noncarcinogenic Intake (mg/kg/day)
246TNT	1.62	0.50	3.04E-05	7.10E-05
HMX	1.04	0.50	--	4.56E-05
RDX	6.67	0.00	0.00E+00 (b)	0.00E+00 (b)

(a) – Exposure point concentration is the 95 percent upper confidence limit on the arithmetic mean of surface soil data (samples less than 2 feet deep). Non-detects are replaced with one-half the detection level for calculating exposure point concentration.

(b) – Because RDX is not dermally absorbed, the carcinogenic and noncarcinogenic intakes are zero.

"--" – Not calculated because contaminant is not considered a carcinogen or potency factor is not available.

* – Replaces original Table 6-93 in the Final Baseline RA; Dames & Moore, 1992a.

TABLE 6−94*

Estimated Contaminant Concentrations in Soil and Estimated Human Intakes Due to Incidental Ingestion of Soil at Site 17 Future Residential Land Use Scenario

Analyte	Exposure Point Concentration (mg/kg)(a)	Carcinogenic Intake (mg/kg/day)	Noncarcinogenic Intake (mg/kg/day)
Antimony	45.7	−−	1.67E−04
Beryllium	2	3.13E−06	7.31E−06
Cadmium	3.12	−−	1.14E−05
Cobalt	15.8	−−	5.77E−05
Copper	167	−−	6.10E−04
Iron	44565	−−	1.63E−01
Lead	837	−−	3.06E−03
Mercury	0.053	−−	1.94E−07
Nickel	17.6	−−	6.43E−05
Silver	0.086	−−	3.14E−07
Zinc	91.9	−−	3.36E−04
246TNT	1.62	2.54E−06	5.92E−06
HMX	1.04	−−	3.80E−06
RDX	6.67	1.04E−05	2.44E−05

(a) − Exposure point concentration is the 95 percent upper confidence limit on the arithmetic mean of surface soil data (samples less than 2 feet deep). Non−detects are replaced with one−half the detection level for calculating exposure point concentration.

"−−" − Not calculated because contaminant is not considered a carcinogen or potency factor is not available.

* − Replaces original Table 6−94 in the Final Baseline RA; Dames & Moore, 1992a.

TABLE 6-95*

Estimated Contaminant Concentrations in Air and Estimated Human Intakes Due to Inhalation of Dust at Site 17 Future Residential Land Use Scenario

Source-Related Dust Concentration for Site 17 is 0.00214 mg/m3 (see Appendix E)

Analyte	Concentration in Soil (mg/kg)(a)	Exposure Point Concentration (mg/m3)(b)	Carcinogenic Intake (mg/kg/day)	Noncarcinogenic Intake (mg/kg/day)
Antimony	45.7	9.77E-08	--	2.68E-08
Beryllium	2	4.27E-09	5.02E-10	1.17E-09
Cadmium	3.12	6.67E-09	7.83E-10	1.83E-09
Cobalt	15.8	3.38E-08	--	9.25E-09
Copper	167	3.57E-07	--	9.78E-08
Iron	44565	9.52E-05	--	2.61E-05
Lead	837	1.79E-06	--	4.90E-07
Mercury	0.053	1.13E-10	--	3.10E-11
Nickel	17.6	3.76E-08	4.42E-09	1.03E-08
Silver	0.086	1.84E-10	--	5.04E-11
Zinc	91.9	1.96E-07	--	5.38E-08
246TNT	1.62	3.46E-09	4.06E-10	9.48E-10
HMX	1.04	2.22E-09	--	6.09E-10
RDX	6.67	1.43E-08	1.67E-09	3.91E-09

(a) - Concentration in soil is the 95 percent upper confidence limit on the arithmetic mean of surface soil data (samples less than 2 feet deep). Non-detects are replaced with one-half the detection level for calculating the soil concentration.

(b) - The exposure point concentration is the product of the total source-related dust concentration and the contaminant concentration in surface soil. The assumption is made that the contaminants are distributed in the air in the same proportion as they are in the surface soil.

"--" - Not calculated because contaminant is not considered a carcinogen or potency factor is not available.

* - Replaces original Table 6-95 in the Final Baseline RA; Dames & Moore, 1992a.

TABLE 6-96*

Estimated Contaminant Concentrations in Crops and Estimated Human Intakes of Contaminants Due to Consumption of Crops at Site 17 Future Residential Land Use Scenario

Analyte	Concentration in Soil (a) (mg/kg)	Concentration in Water (b) (ug/l)	Concentration in Crops (mg/kg)	Carcinogenic Intake (mg/kg/day)	Noncarcinogenic Intake (mg/kg/day)
Antimony	45.7	NA	xx	--	xx
Beryllium	2	NA	2.00E-03	9.39E-07	2.19E-06
Cadmium	3.12	NA	1.87E-01	--	2.05E-04
Cobalt	15.8	NA	xx	--	xx
Copper	167	NA	xx	--	xx
Iron	44565	NA	xx	--	xx
Lead	837	NA	4.19E+00	--	4.59E-03
Mercury	0.053	NA	4.77E-03	--	5.23E-06
Nickel	17.6	NA	8.80E-01	--	9.64E-04
Silver	0.086	NA	xx	--	xx
Zinc	91.9	NA	xx	--	xx
246TNT	1.62	NA	4.38E+00	2.06E-03	4.80E-03
HMX	1.04	NA	2.85E+01	--	3.12E-02
RDX	6.67	NA	8.12E+01	3.81E-02	8.89E-02

(a) Concentration in soil is the 95 percent upper confidence limit on the arithmetic mean of surface soil data (samples less than 2 feet deep). Non-detects are replaced with one-half the detection level for calculating the soil concentration.

(b) Concentration in groundwater is the 95 percent upper confidence limit on the arithmetic mean of groundwater data. Non-detects are replaced with one-half the detection level for calculating the groundwater concentration.

"--" – Not calculated because contaminant is not considered a carcinogen or potency factor is not available.

"xx" – Quantitative information on uptake factors not available.

"ND" – Not detected.

"NA" – Not applicable because groundwater samples were not collected at this site.

* – Replaces original Table 6-96 in the Final Baseline RA; Dames & Moore, 1992a.

TABLE 6-97*

Estimated Contaminant Concentrations in Air and Estimated Human Intakes Due to Inhalation of Dust at Site 17 Future Military Land Use Scenario

Source-Related Dust Concentration for Site 17 is 0.0495 mg/m3 (see Appendix E)

Analyte	Concentration in Soil (mg/kg)(a)	Exposure Point Concentration (mg/m3)(b)	Carcinogenic Intake (mg/kg/day)	Noncarcinogenic Intake (mg/kg/day)
Antimony	45.7	2.26E-06	--	4.13E-07
Beryllium	2	9.90E-08	7.75E-10	1.81E-08
Cadmium	3.12	1.54E-07	1.21E-09	2.82E-08
Cobalt	15.8	7.82E-07	--	1.43E-07
Copper	167	8.27E-06	--	1.51E-06
Iron	44565	2.21E-03	--	4.03E-04
Lead	837	4.14E-05	--	7.57E-06
Mercury	0.053	2.62E-09	--	4.79E-10
Nickel	17.6	8.71E-07	6.82E-09	1.59E-07
Silver	0.086	4.26E-09	--	7.78E-10
Zinc	91.9	4.55E-06	--	8.31E-07
246TNT	1.62	8.02E-08	6.28E-10	1.46E-08
HMX	1.04	5.15E-08	--	9.40E-09
RDX	6.67	3.30E-07	2.58E-09	6.03E-08

(a) - Concentration in soil is the 95 percent upper confidence limit on the arithmetic mean of surface soil data (samples less than 2 feet deep). Non-detects are replaced with one-half the detection level for calculating the soil concentration.

(b) - The exposure point concentration is the product of the total source-related dust concentration and the contaminant concentration in surface soil. The assumption is made that the contaminants are distributed in the air in the same proportion as they are in the surface soil.

"--" - Not calculated because contaminant is not considered a carcinogen or potency factor is not available.

* - Replaces original Table 6-97 in the Final Baseline RA; Dames & Moore, 1992a.

The soil concentration used is the 95 percent UCL on the arithmetic mean of surface soil data (to a depth of 2 feet) for Site 17, obtained from Table 3-27*.

6.5.2.2.7* <u>Site 18: Dunnage Pits</u>. Tables 6-98* and 6-99* present estimated exposure point concentrations and carcinogenic and noncarcinogenic intakes for incidental soil ingestion (pathway 2) and dust inhalation (pathway 3), respectively, for the future residential land use scenario at followup fieldwork Site 18. Table 6-100 in the Baseline RA, which presents exposure point concentrations and carcinogenic and noncarcinogenic intakes for groundwater ingestion (pathway 5) for the future residential land use scenario at Site 18, is not affected by the followup fieldwork. Table 6-101* presents the estimated soil concentration, groundwater concentration, crop concentration, and carcinogenic and noncarcinogenic intakes for crop ingestion (pathway 12) for the future residential land use scenario at Site 18.

Table 6-102* presents estimated exposure point concentrations and carcinogenic and noncarcinogenic intakes for dust inhalation (pathway 3) for the future military (tank training) land use scenario at Site 18.

The soil concentration used for Site 18 is the 95 percent UCL on the arithmetic mean of surface soil data (to a depth of 2 feet) for Site 18, obtained from Table 3-29*. The groundwater concentration used is the 95 percent UCL on the arithmetic mean of groundwater data for Site 18, obtained from Table 3-28 in the Baseline RA.

6.5.2.2.8* <u>Site 19: Open Burning Trenches/Pads</u>. Tables 6-103* through 6-105* present estimated exposure point concentrations and carcinogenic and noncarcinogenic intakes for dermal absorption of contaminants in soil (pathway 1), incidental soil ingestion (pathway 2), and dust inhalation (pathway 3), respectively, for the future residential land use scenario at followup fieldwork Site 19. Tables 6-106* and 6-107* present estimated exposure point concentrations and carcinogenic and noncarcinogenic intakes for groundwater ingestion (pathway 5) and dermal absorption of contaminants in groundwater (pathway 7), respectively, for the future residential land use scenario at Site 19. Table 6-108* presents the estimated soil concentration, groundwater

TABLE 6-98*

Estimated Contaminant Concentrations in Soil and Estimated Human Intakes Due to Incidental Ingestion of Soil at Site 18 Future Residential Land Use Scenario

Analyte	Exposure Point Concentration (mg/kg)(a)	Carcinogenic Intake (mg/kg/day)	Noncarcinogenic Intake (mg/kg/day)
Aluminum	18093	--	6.61E-02
Arsenic	4.82	7.55E-06	1.76E-05
Barium	309	--	1.13E-03
Chromium	45	--	1.64E-04
Copper	64.7	--	2.36E-04
Lead	250	--	9.13E-04
Manganese	1047	--	3.82E-03
Nickel	199	--	7.27E-04
Silver	1.01	--	3.69E-06
Sodium	1757	--	6.42E-03
Zinc	978	--	3.57E-03
1,1,1-Trichloroethane	0.007 (b)	--	2.56E-08
Di-n-butyl phthalate	0.147	--	5.37E-07
Phenanthrene	0.047 (b)	--	1.72E-07
DDE	0.006	9.39E-09	2.19E-08
DDT	0.007	1.10E-08	2.56E-08

(a) – Exposure point concentration is the 95 percent upper confidence limit on the arithmetic mean of surface soil data (samples less than 2 feet deep). Non-detects are replaced with one-half the detection level for calculating exposure point concentration.

(b) – The 95 percent upper confidence limits on the arithmetic mean exceeds the maximum detected concentration; therefore, the maximum detected value is presented (USEPA, 1989b).

"--" – Not calculated because contaminant is not considered a carcinogen or potency factor is not available.

* – Replaces original Table 6-98 in the Final Baseline RA; Dames & Moore, 1992a.

TABLE 6-99*

Estimated Contaminant Concentrations in Air and Estimated Human Intakes Due to Inhalation of Dust at Site 18 Future Residential Land Use Scenario

Source-Related Dust Concentration for Site 18 is 0.00529 mg/m3 (see Appendix E)

Analyte	Concentration in Soil (mg/kg)(a)	Exposure Point Concentration (mg/m3)(b)	Carcinogenic Intake (mg/kg/day)	Noncarcinogenic Intake (mg/kg/day)
Aluminum	18093	9.57E-05	--	2.62E-05
Arsenic	4.82	2.55E-08	2.99E-09	6.99E-09
Barium	309	1.63E-06	--	4.48E-07
Chromium	45	2.38E-07	2.80E-08	6.52E-08
Copper	64.7	3.42E-07	--	9.38E-08
Lead	250	1.32E-06	--	3.62E-07
Manganese	1047	5.54E-06	--	1.52E-06
Nickel	199	1.05E-06	1.24E-07	2.88E-07
Silver	1.01	5.34E-09	--	1.46E-09
Sodium	1757	9.29E-06	--	2.55E-06
Zinc	978	5.17E-06	--	1.42E-06
1,1,1-Trichloroethane	0.007 (c)	3.70E-11	--	1.01E-11
Di-n-butyl phthalate	0.147	7.78E-10	--	2.13E-10
Phenanthrene	0.047 (c)	2.49E-10	--	6.81E-11
DDE	0.006	3.17E-11	3.73E-12	8.70E-12
DDT	0.007	3.70E-11	4.35E-12	1.01E-11

(a) – Concentration in soil is the 95 percent upper confidence limit on the arithmetic mean of surface soil data (samples less than 2 feet deep). Non-detects are replaced with one-half the detection level for calculating the soil concentration.

(b) – The exposure point concentration is the product of the total source-related dust concentration and the contaminant concentration in surface soil. The assumption is made that the contaminants are distributed in the air in the same proportion as they are in the surface soil.

(c) – The 95 percent upper confidence limit on the arithmetic mean exceeds the maximum detected concentration; therefore, the maximum detected value is presented (USEPA, 1989b).

"--" – Not calculated because contaminant is not considered a carcinogen or potency factor is not available.

* – Replaces original Table 6-99 in the Final Baseline RA; Dames & Moore, 1992a.

TABLE 6-101*

Estimated Contaminant Concentrations In Crops and Estimated Human Intakes of Contaminants Due to Consumption of Crops at Site 18 Future Residential Land Use Scenario

Analyte	ncentration n Soil (a) (mg/kg)		Concentration In Water (b) (ug/l)	Concentration In Crops (mg/kg)	Carcinogenic Intake (mg/kg/day)	Noncarcinogenic Intake (mg/kg/day)
Aluminum	18093		ND	xx	–	xx
Arsenic	4.82		40	1.94E-02	9.13E-06	2.13E-05
Barium	309		147	xx	–	xx
Chromium	45		ND	4.50E-02	–	4.93E-05
Copper	64.7		ND	xx	–	xx
Lead	250		1.41	1.25E+00	–	1.37E-03
Manganese	1047		369	xx	–	xx
Nickel	199		ND	9.95E+00	–	1.09E-02
Silver	1.01		ND	xx	–	xx
Sodium	1757		92000	xx	–	xx
Vanadium	71.2		19.1	xx	–	xx
Zinc	978		ND	xx	–	xx
1,1,1-Trichloroethane	0.007	(b)	ND	9.86E-03	–	1.08E-05
Di-n-butyl phthalate	0.147		ND	3.30E-03	–	3.62E-06
Phenanthrene	0.047	(b)	ND	4.81E-03	–	5.27E-06
DDE	0.006		ND	1.19E-04	5.61E-08	1.31E-07
DDT	0.007		ND	5.72E-05	2.68E-08	6.26E-08

(a) - Unless otherwise noted, the concentration in soil is the 95 percent upper confidence limit on the arithmetic mean of surface soil data (samples less than 2 feet deep). Non-detects are replaced with one-half the detection level for calculating the soil concentration.

(b) - The 95 percent upper confidence limit on the arithmetic mean exceeds the maximum detected concentration; therefore, the maximum detected concentration is used.

"–" - Not calculated because contaminant is not considered a carcinogen or potency factor is not available.

"xx" - Quantitative information on uptake factors not available.

"ND" - Not detected.

* - Replaces original Table 6-101 in the Final Baseline RA; Dames & Moore, 1992a.

TABLE 6-102*

Estimated Contaminant Concentrations in Air and Estimated Human Intakes Due to Inhalation of Dust at Site 18 Future Military Land Use Scenario

Source-Related Dust Concentration for Site 18 is 0.185 mg/m3 (see Appendix E)

Analyte	Concentration in Soil (mg/kg)(a)	Exposure Point Concentration (mg/m3)(b)	Carcinogenic Intake (mg/kg/day)	Noncarcinogenic Intake (mg/kg/day)
Aluminum	18093	3.35E-03	--	6.11E-04
Arsenic	4.82	8.92E-07	6.98E-09	1.63E-07
Barium	309	5.72E-05	--	1.04E-05
Chromium	45	8.33E-06	6.52E-08	1.52E-06
Copper	64.7	1.20E-05	--	2.19E-06
Lead	250	4.63E-05	--	8.45E-06
Manganese	1047	1.94E-04	--	3.54E-05
Nickel	199	3.68E-05	2.88E-07	6.72E-06
Silver	1.01	1.87E-07	--	3.41E-08
Sodium	1757	3.25E-04	--	5.94E-05
Zinc	978	1.81E-04	--	3.30E-05
1,1,1-Trichloroethane	0.007 (c)	1.30E-09	--	2.37E-10
Di-n-butyl phthalate	0.147	2.72E-08	--	4.97E-09
Phenanthrene	0.047 (c)	8.70E-09	--	1.59E-09
DDE	0.006	1.11E-09	8.69E-12	2.03E-10
DDT	0.007	1.30E-09	1.01E-11	2.37E-10

(a) - Concentration in soil is the 95 percent upper confidence limit on the arithmetic mean of surface soil data (samples less than 2 feet deep). Non-detects are replaced with one-half the detection level for calculating the soil concentration.

(b) - The exposure point concentration is the product of the total source-related dust concentration and the contaminant concentration in surface soil. The assumption is made that the contaminants are distributed in the air in the same proportion as they are in the surface soil.

(c) - The 95 percent upper confidence limit on the arithmetic mean exceeds the maximum detected concentration; therefore, the maximum detected concentration is used.

"--" - Not calculated because contaminant is not considered a carcinogen or potency factor is not available.

* - Replaces original Table 6-102 in the Final Baseline RA; Dames & Moore, 1992a.

TABLE 6–103*

Estimated Contaminant Concentrations in Soil and Estimated Human Intakes Due to Dermal Absorption of Contaminants in Soil at Site 19 Future Residential Land Use Scenario

Analyte	Exposure Point Concentration (mg/kg)(a)	Dermal Absorption Factor (unitless)	Carcinogenic Intake (mg/kg/day)	Noncarcinogenic Intake (mg/kg/day)
135TNB	39.8	0.50	--	1.74E–03
246TNT	10019	0.50	1.88E–01	4.39E–01
Nitrobenzene	3.23 (b)	0.50	--	1.42E–04
Tetryl	1.48 (b)	0.50	--	6.49E–05

(a) – Unless otherwise noted, the exposure point concentration is the 95 percent upper confidence limit on the arithmetic mean of surface soil data (samples less than 2 feet deep). Non–detects are replaced with one–half the detection level for calculating exposure point concentration.

(b) – The 95 percent upper confidence limit on the arithmetic mean exceeds the maximum detected concentration; therefore, the maximum detected concentration is used as the exposure point concentration.

"--" – Not calculated because contaminant is not considered a carcinogen or potency factor is not available.

* – Replaces original Table 6–103 in the Final Baseline RA; Dames & Moore, 1992a.

TABLE 6-104*

Estimated Contaminant Concentrations in Soil and Estimated Human Intakes Due to Incidental Ingestion of Soil at Site 19 Future Residential Land Use Scenario

Analyte	Exposure Point Concentration (mg/kg)(a)	Carcinogenic Intake (mg/kg/day)	Noncarcinogenic Intake (mg/kg/day)
Aluminum	12641	--	4.62E-02
Antimony	890	--	3.25E-03
Arsenic	70.2	1.10E-04	2.56E-04
Barium	8100	--	2.96E-02
Cadmium	183	--	6.68E-04
Chromium	22	--	8.04E-05
Copper	31693	--	1.16E-01
Lead	1225	--	4.47E-03
Mercury	0.889	--	3.25E-06
Nickel	23.5	--	8.58E-05
Potassium	2652	--	9.69E-03
Silver	1.37	--	5.00E-06
Sodium	722	--	2.64E-03
Zinc	60365	--	2.21E-01
135TNB	39.8	--	1.45E-04
246TNT	10019	1.57E-02	3.66E-02
Nitrobenzene	3.23 (b)	--	1.18E-05
Tetryl	1.48 (b)	--	5.41E-06
Nitrite/nitrate	11.2	--	4.09E-05

(a) – Unless otherwise noted, the exposure point concentration is the 95 percent upper confidence limit on the arithmetic mean of surface soil data (samples less than 2 feet deep). Non-detects are replaced with one-half the detection level for calculating exposure point concentration.

(b) – The 95 percent upper confidence limit on the arithmetic mean exceeds the maximum detected concentration; therefore, the maximum detected concentration is used as the exposure point concentration.

"--" – Not calculated because contaminant is not considered a carcinogen or potency factor is not available.

* – Replaces original Table 6-104 in the Final Baseline RA; Dames & Moore, 1992a.

TABLE 6-105*

Estimated Contaminant Concentrations in Air and Estimated Human Intakes Due to Inhalation of Dust at Site 19 Future Residential Land Use Scenario

Source-Related Dust Concentration for Site 19 is 0.00468 mg/m3 (see Appendix E)

Analyte	Concentration in Soil (mg/kg)(a)	Exposure Point Concentration (mg/m3)(b)	Carcinogenic Intake (mg/kg/day)	Noncarcinogenic Intake (mg/kg/day)
Aluminum	12641	5.92E-05	--	1.62E-05
Antimony	890	4.17E-06	--	1.14E-06
Arsenic	70.2	3.29E-07	3.86E-08	9.00E-08
Barium	8100	3.79E-05	--	1.04E-05
Cadmium	183	8.56E-07	1.01E-07	2.35E-07
Chromium	22	1.03E-07	1.21E-08	2.82E-08
Copper	31693	1.48E-04	--	4.06E-05
Lead	1225	5.73E-06	--	1.57E-06
Mercury	0.889	4.16E-09	--	1.14E-09
Nickel	23.5	1.10E-07	1.29E-08	3.01E-08
Potassium	2652	1.24E-05	--	3.40E-06
Silver	1.37	6.41E-09	--	1.76E-09
Sodium	722	3.38E-06	--	9.26E-07
Zinc	60365	2.83E-04	--	7.74E-05
135TNB	39.8	1.86E-07	--	5.10E-08
246TNT	10019	4.69E-05	5.51E-06	1.28E-05
Nitrobenzene	3.23 (c)	1.51E-08	--	4.14E-09
Tetryl	1.48 (c)	6.93E-09	--	1.90E-09
Nitrite/nitrate	11.2	5.24E-08	--	1.44E-08

(a) – Unless otherwise noted, the concentration in soil is the 95 percent upper confidence limit on the arithmetic mean of surface soil data (samples less than 2 feet deep). Non-detects are replaced with one-half the detection level for calculating the soil concentration.

(b) – The exposure point concentration is the product of the total source-related dust concentration and the contaminant concentration in surface soil. The assumption is made that the contaminants are distributed in the air in the same proportion as they are in the surface soil.

(c) – The 95 percent upper confidence limit on the arithmetic mean exceeds the maximum detected concentration; therefore, the maximum detected concentration is used.

"--" – Not calculated because contaminant is not considered a carcinogen or potency factor is not available.

* – Replaces original Table 6-105 in the Final Baseline RA; Dames & Moore, 1992a.

TABLE 6–106*

Estimated Contaminant Concentrations in Groundwater and Estimated Human Intakes Due to Ingestion of Groundwater at Site 19 Future Residential Land Use Scenario

Analyte	Exposure Point Concentration (ug/l)(a)	Carcinogenic Intake (mg/kg/day)	Noncarcinogenic Intake (mg/kg/day)
Antimony	18.4	--	5.04E-04
Arsenic	18.2 (b)	2.14E-04	4.99E-04
Beryllium	0.5 (b)	5.87E-06	1.37E-05
Copper	3.32 (b)	--	9.10E-05
Lead	9.53	--	2.61E-04
Nickel	17.7	--	4.85E-04
Selenium	29.8	--	8.16E-04
Vanadium	89.5	--	2.45E-03
13DNB	0.415	--	1.14E-05

(a) – Unless otherwise noted, the exposure point concentration is the 95 percent upper confidence limit on the arithmetic mean of groundwater data. Non–detects are replaced with one–half the detection level for calculating the exposure point concentration.

(b) – The 95 percent upper confidence limit on the arithmetic mean exceeds the maximum detected concentration; therefore, the maximum detected concentration is used as the exposure point concentration.

"--" Not calculated because contaminant is not considered a carcinogen or potency factor is not available.

* – Replaces original Table 6–106 in the Final Baseline RA; Dames & Moore, 1992a.

TABLE 6-107*

Estimated Contaminant Concentrations in Groundwater and Estimated Human Intakes Due to Dermal Absorption of Groundwater Contaminants at Site 19 Future Residential Land Use Scenario

Analyte	Exposure Point Concentration (ug/l)(a)	Permeability Coefficient (Kp)(cm/hr)	Carcinogenic Intake (mg/kg/day)	Noncarcinogenic Intake (mg/kg/day)
13DNB	0.415	2.1E-03	--	4.06E-08

(a) – Unless otherwise noted, the exposure point concentration is the 95 percent upper confidence limit on the arithmetic mean of groundwater data. Non-detects are replaced with one-half the detection level for calculating the exposure point concentration.

"--" – Not calculated because contaminant is not considered a carcinogen or potency factor is not available.

* – Replaces original Table 6-107 in the Final Baseline RA; Dames & Moore, 1992a.

TABLE 6–108*

Estimated Contaminant Concentrations in Crops and Estimated Human Intakes of Contaminants Due to Consumption of Crops at Site 19 Future Residential Land Use Scenario

Analyte	Concentration in Soil (a) (mg/kg)	Concentration in Water (b) (ug/l)	Concentration in Crops (mg/kg)	Carcinogenic Intake (mg/kg/day)	Noncarcinogenic Intake (mg/kg/day)
Aluminum	12641	ND	xx	--	xx
Antimony	890	18.4	xx	--	xx
Arsenic	70.2	18.2 (c)	2.81E-01	1.32E-04	3.08E-04
Barium	8100	58.6 (c)	xx	--	xx
Beryllium	1.01	0.5 (c)	1.01E-03	4.75E-07	1.11E-06
Cadmium	183	ND	1.10E+01	--	1.20E-02
Chromium	22	ND	2.20E-02	--	2.41E-05
Copper	31693	3.32 (c)	xx	--	xx
Lead	1225	9.53	6.13E+00	--	6.71E-03
Manganese	533	43.6	xx	--	xx
Mercury	0.889	ND	8.00E-02	--	8.77E-05
Nickel	23.5	17.7	1.18E+00	--	1.29E-03
Potassium	2652	5224	xx	--	xx
Selenium	ND	29.8	xx	--	xx
Silver	1.37	0.207	xx	--	xx
Sodium	722	79463	xx	--	xx
Vanadium	53	89.5	xx	--	xx
Zinc	60365	20.3	xx	--	xx
135TNB	39.8	ND	3.20E+02	--	3.51E-01
246TNT	10019	ND	2.71E+04	1.27E+01	2.97E+01
13DNB	ND	0.415	1.39E-03	--	1.53E-06
Nitrobenzene	3.23 (c)	ND	1.07E+01	--	1.17E-02
Tetryl	1.48 (c)	ND	6.38E+00	--	6.99E-03
Nitrite/nitrate	11.2	4570	xx	--	xx

(a) – Unless otherwise noted, the concentration in soil is the 95 percent upper confidence limit on the arithmetic mean of surface soil data (samples less than 2 feet deep). Non-detects are replaced with one-half the detection level for calculating the soil concentration.

(b) – Unless otherwise noted, the concentration in groundwater is the 95 percent upper confidence limit on the arithmetic mean of groundwater data. Non-detects are replaced with one-half the detection level for calculating the groundwater concentration.

(c) – The 95 percent upper confidence limit on the arithmetic mean exceeds the maximum detected concentration; therefore, the maximum detected concentration is used as the exposure point concentration.

"--" – Not calculated because contaminant is not considered a carcinogen or potency factor is not available.

"xx" – Quantitative information on uptake factors not available.

"ND" – Not detected.

* – Replaces original Table 6–106 in the Final Baseline RA; Dames & Moore, 1992a.

concentration, crop concentration, and carcinogenic and noncarcinogenic intakes for crop ingestion (pathway 12) for the future residential land use scenario at Site 19.

Table 6-109* presents estimated exposure point concentrations and carcinogenic and noncarcinogenic intakes for dust inhalation (pathway 3) for the future military (tank training) land use scenario at Site 19.

The soil concentration used is the 95 percent UCL on the arithmetic mean of surface soil data (to a depth of 2 feet) for Site 19, obtained from Table 3-32*. The groundwater concentration used is the 95 percent UCL on the arithmetic mean of groundwater data for Site 19, obtained from Table 3-31*.

6.5.2.3* Operable Unit C: Inactive Landfills

6.5.2.3.1* Site 12: Inactive Landfill. Tables 6-185A and 6-185B present estimated exposure point concentrations and carcinogenic and noncarcinogenic intakes for incidental soil ingestion (pathway 2) and dust inhalation (pathway 3), respectively, for the future residential land use scenario at followup fieldwork Site 12. Tables 6-186 and 6-187 in the Baseline RA, which present exposure point concentrations and carcinogenic and noncarcinogenic intakes for groundwater ingestion (pathway 5) and dermal absorption of contaminants in groundwater (pathway 7), respectively, for the future residential land use scenario at Site 12, are not affected by the followup fieldwork. Table 6-188* presents the estimated groundwater concentration, crop concentration, and carcinogenic and noncarcinogenic intakes for crop ingestion (pathway 12) for the future residential land use scenario at Site 12.

The soil concentration used is the 95 percent UCL on the arithmetic mean of surface soil data (to a depth of 2 feet) for Site 12, obtained from Table 3-62A. The groundwater concentration used is the 95 percent UCL on the arithmetic mean of groundwater data for Site 12, obtained from Table 3-62 in the Baseline RA.

6.5.2.3.2* Site 50: Railroad Landfill Area. Tables 6-189* and 6-190* present estimated exposure point concentrations and carcinogenic and noncarcinogenic intakes for groundwater ingestion (pathway 5) and dermal absorption of contaminants in

TABLE 6-109*

Estimated Contaminant Concentrations in Air and Estimated Human Intakes Due to Inhalation of Dust at Site 19 Future Military Land Use Scenario

Source-Related Dust Concentration for Site 19 is 0.435 mg/m3 (see Appendix E)

Analyte	Concentration in Soil (mg/kg)(a)	Exposure Point Concentration (mg/m3)(b)	Carcinogenic Intake (mg/kg/day)	Noncarcinogenic Intake (mg/kg/day)
Aluminum	12641	5.50E-03	--	1.00E-03
Antimony	890	3.87E-04	--	7.07E-05
Arsenic	70.2	3.05E-05	2.39E-07	5.58E-06
Barium	8100	3.52E-03	--	6.44E-04
Cadmium	183	7.96E-05	6.23E-07	1.45E-05
Chromium	22	9.57E-06	7.49E-08	1.75E-06
Copper	31693	1.38E-02	--	2.52E-03
Lead	1225	5.33E-04	--	9.73E-05
Mercury	0.889	3.87E-07	--	7.06E-08
Nickel	23.5	1.02E-05	8.00E-08	1.87E-06
Potassium	2652	1.15E-03	--	2.11E-04
Silver	1.37	5.96E-07	--	1.09E-07
Sodium	722	3.14E-04	--	5.74E-05
Zinc	60365	2.63E-02	--	4.80E-03
135TNB	39.8	1.73E-05	--	3.16E-06
246TNT	10019	4.36E-03	3.41E-05	7.96E-04
Nitrobenzene	3.23 (c)	1.41E-06	--	2.57E-07
Tetryl	1.48 (c)	6.44E-07	--	1.18E-07
Nitrite/nitrate	11.2	4.87E-06	--	8.90E-07

(a) – Unless otherwise noted, the concentration in soil is the 95 percent upper confidence limit on the arithmetic mean of surface soil data (samples less than 2 feet deep). Non-detects are replaced with one-half the detection level for calculating the soil concentration.

(b) – The exposure point concentration is the product of the total source-related dust concentration and the contaminant concentration in surface soil. The assumption is made that the contaminants are distributed in the air in the same proportion as they are in the surface soil.

(c) – The 95 percent upper confidence limit on the arithmetic mean exceeds the maximum detected concentration; therefore, the maximum detected concentration is used.

"--" – Not calculated because contaminant is not considered a carcinogen or potency factor is not available.

* – Replaces original Table 6-109 in the Final Baseline RA; Dames & Moore, 1992a.

TABLE 6–185A

Estimated Contaminant Concentrations in Soil and Estimated Human Intakes Due to Incidental Ingestion of Soil at Site 12 Future Residential Land Use Scenario

Analyte	Exposure Point Concentration (mg/kg)(a)	Carcinogenic Intake (mg/kg/day)	Noncarcinogenic Intake (mg/kg/day)
Lead	26.1	--	9.53E–05
Silver	0.064 (b)	--	2.34E–07
Zinc	136	--	4.97E–04
Benzo(k)fluoranthene	0.081	1.27E–07	2.96E–07
Chrysene	0.185	2.90E–07	6.76E–07
Fluoranthene	0.125	--	4.57E–07
Phenanthrene	0.097	--	3.54E–07
Pyrene	0.256	--	9.35E–07
DDE	0.141	2.21E–07	5.15E–07
DDT	0.061	9.55E–08	2.23E–07

(a) – Exposure point concentration is the 95 percent upper confidence limit on the arithmetic mean of surface soil data (samples less than 2 feet deep). Non–detects are replaced with one–half the detection level for calculating exposure point concentration.

(b) – The 95 percent upper confidence limit on the arithmetic mean exceeds the maximum detected concentration; therefore, the maximum detected concentration is used as the exposure point concentration (USEPA, 1989b).

"--" – Not calculated because contaminant is not considered a carcinogen or potency factor is not available.

TABLE 6-185B

Estimated Contaminant Concentrations in Air and Estimated Human Intakes Due to Inhalation of Dust at Site 12 Future Residential Land Use Scenario

Source-Related Dust Concentration for Site 12 is 0.002681 mg/m3 (see Appendix E)

Analyte	Concentration in Soil (mg/kg)(a)	Exposure Point Concentration (mg/m3)(b)	Carcinogenic Intake (mg/kg/day)	Noncarcinogenic Intake (mg/kg/day)
Lead	26.1	7.00E-08	--	1.92E-08
Silver	0.064 (c)	1.72E-10	--	4.70E-11
Zinc	136	3.65E-07	--	9.99E-08
Benzo(k)fluoranthene	0.081	2.17E-10	2.55E-11	5.95E-11
Chrysene	0.185	4.96E-10	5.82E-11	1.36E-10
Fluoranthene	0.125	3.35E-10	--	9.18E-11
Phenanthrene	0.097	2.60E-10	--	7.12E-11
Pyrene	0.256	6.86E-10	--	1.88E-10
DDE	0.141	3.78E-10	4.44E-11	1.04E-10
DDT	0.061	1.64E-10	1.92E-11	4.48E-11

(a) – Concentration in soil is the 95 percent upper confidence limit on the arithmetic mean of surface soil data (samples less than 2 feet deep). Non-detects are replaced with one-half the detection level for calculating the soil concentration.

(b) – The exposure point concentration is the product of the total source-related dust concentration and the contaminant concentration in surface soil. The assumption is made that the contaminants are distributed in the air in the same proportion as they are in the surface soil.

(c) – The 95 percent upper confidence limit on the arithmetic mean exceeds the maximum detected concentration; therefore, therefore, the maximum detected concentration is used as the exposure point concentration (USEPA, 1989b).

"--" – Not calculated because contaminant is not considered a carcinogen or potency factor is not available.

TABLE 6-188*

Estimated Contaminant Concentrations in Crops and Estimated Human Intakes of Contaminants Due to Consumption of Crops at Site 12 Future Residential Land Use Scenario

Analyte	Concentration in Soil (a) (mg/kg)	Concentration in Water (b) (ug/l)	Concentration in Crops (mg/kg)	Carcinogenic Intake (mg/kg/day)	Noncarcinogenic Intake (mg/kg/day)
Antimony	ND	2.88	xx	--	xx
Arsenic	1.96	5.23	7.86E-03	3.69E-06	8.61E-06
Copper	18.8	5.82	xx	--	xx
Lead	26.1	2.06	1.31E-01	--	1.43E-04
Nickel	9.640 (c)	25.7	4.83E-01	--	5.30E-04
Silver	0.064 (c)	ND	xx	--	xx
Vanadium	68.2	30.3	xx	--	xx
Zinc	136	379	xx	--	xx
Cyanide	ND	4.16	xx	--	xx
RDX	ND	1.21	4.36E-03	2.05E-06	4.77E-06
Tetryl	ND	0.373	1.23E-03	--	1.35E-06
Benzo(k)fluoranthene	0.081	ND	3.49E-04	1.64E-07	3.83E-07
Chrysene	0.185	ND	4.08E-03	1.92E-06	4.47E-06
Fluoranthene	0.125	ND	4.02E-03	--	4.40E-06
Phenanthrene	0.097	ND	9.93E-03	--	1.09E-05
Pyrene	0.256	ND	1.45E-02	--	1.59E-05
DDE	0.141	ND	2.81E-03	1.32E-06	3.08E-06
DDT	0.061	ND	4.98E-04	2.34E-07	5.46E-07

(a) Concentration in soil is the 95 percent upper confidence limit on the arithmetic mean of surface soil data (samples less than 2 feet deep). Non-detects are replaced with one-half the detection level for calculating the soil concentration.

(b) Concentration in groundwater is the 95 percent upper confidence limit on the arithmetic mean of groundwater data. Non-detects are replaced with one-half the detection level for calculating the groundwater concentration.

"--" – Not calculated because contaminant is not considered a carcinogen or potency factor is not available.

"xx" – Quantitative information on uptake factors not available.

"ND" – Not detected.

"NA" – Not analyzed.

* – Replaces original Table 6-188 in the Final Baseline RA; Dames & Moore, 1992a.

TABLE 6-189*

Estimated Contaminant Concentrations in Groundwater and Estimated Human Intakes Due to Ingestion of Groundwater at Site 50 Future Residential Land Use Scenario

Analyte	Exposure Point Concentration (ug/l)(a)	Carcinogenic Intake (mg/kg/day)	Noncarcinogenic Intake (mg/kg/day)
Arsenic	5.51	6.47E-05	1.51E-04
Copper	7.42	--	2.03E-04
Nickel	53.8	--	1.47E-03
Vanadium	30.9 (b)	--	8.47E-04
Zinc	523	--	1.43E-02
Cyanide	12.1	--	3.32E-04
RDX	1.94	2.28E-05	5.32E-05

(a) – Unless otherwise noted, the exposure point concentration is the 95 percent upper confidence limit on the arithmetic mean of groundwater data. Non-detects are replaced with one-half the detection level for calculating the exposure point concentration.

(b) – The 95 percent upper confidence limit on the arithmetic mean exceeds the maximum detected concentration; therefore, the maximum detected concentration is used as the exposure point concentration.

"--" Not calculated because contaminant is not considered a carcinogen or potency factor is not available.

* – Replaces original Table 6-189 in the Final Baseline RA; Dames & Moore, 1992a.

TABLE 6–190*

Estimated Contaminant Concentrations in Groundwater and Estimated Human Intakes Due to Dermal Absorption of Groundwater Contaminants at Site 50 Future Residential Land Use Scenario

Analyte	Exposure Point Concentration (ug/l)(a)	Permeability Coefficient (Kp)(cm/hr)	Carcinogenic Intake (mg/kg/day)	Noncarcinogenic Intake (mg/kg/day)
RDX	1.94	3.5E–04	1.36E–08	3.16E–08

(a) – Unless otherwise noted, the exposure point concentration is the 95 percent upper confidence limit on the arithmetic mean of groundwater data. Non–detects are replaced with one–half the detection level for calculating the exposure point concentration.

* – Replaces original Table 6–190 in the Final Baseline RA; Dames & Moore, 1992a.

groundwater (pathway 7), respectively, for the future residential land use scenario at followup fieldwork Site 50. Table 6-191* presents the estimated groundwater concentration, crop concentration, and carcinogenic and noncarcinogenic intakes for crop ingestion (pathway 12) for the future residential land use scenario at Site 50.

Because surface soil samples were not collected at this site, soil concentrations are not presented in Table 6-191*. The groundwater concentration used is the 95 percent UCL on the arithmetic mean of groundwater data for Site 50, obtained from Table 3-64*.

6.5.2.5* Operable Unit E: Deactivation Furnace and Southwestern Warehouse Area

6.5.2.5.3* Site 26: Metal Ingot Stockpiles. Tables 6-202* through 6-204* present estimated exposure point concentrations and carcinogenic and noncarcinogenic intakes for incidental soil ingestion (pathway 2), dust inhalation (pathway 3), and crop ingestion (pathway 12), respectively, for the future residential land use scenario at followup fieldwork Site 26.

The soil concentration used is the 95 percent UCL on the arithmetic mean of surface soil data (to a depth of 2 feet) for Site 26, obtained from Table 3-71*.

6.5.2.6* Operable Unit F: Sewage Treatment Plant and Vicinity

6.5.2.6.1* Site 30: Stormwater Discharge Area. Tables 6-220* through 6-222* present estimated exposure point concentrations and carcinogenic and noncarcinogenic intakes for incidental soil ingestion (pathway 2), dust inhalation (pathway 3), and crop ingestion (pathway 12), respectively, for the future residential land use scenario at followup fieldwork Site 30.

The soil concentration used is the 95 percent UCL on the arithmetic mean of surface soil data (to a depth of 2 feet) for Site 30, obtained from Table 3-81*.

6.5.2.6.2* Site 48: Pipe Discharge Area. Tables 6-223* through 6-225* present estimated exposure point concentrations and carcinogenic and noncarcinogenic intakes for incidental soil ingestion (pathway 2), dust inhalation (pathway 3), and crop

TABLE 6-191*

Estimated Contaminant Concentrations in Crops and Estimated Human Intakes of Contaminants Due to Consumption of Crops at Site 50 Future Residential Land Use Scenario

Analyte	Concentration in Soil (a) (mg/kg)	Concentration in Water (b) (ug/l)	Concentration in Crops (mg/kg)	Carcinogenic Intake (mg/kg/day)	Noncarcinogenic Intake (mg/kg/day)
Arsenic	NA	5.51	2.20E-05	1.04E-08	2.42E-08
Copper	NA	7.42	xx	--	xx
Nickel	NA	53.8	2.69E-03	--	2.95E-06
Vanadium	NA	30.9 (c)	xx	--	xx
Zinc	NA	523	xx	--	xx
Cyanide	NA	12.1	xx	--	xx
RDX	NA	1.94	6.98E-03	3.28E-06	7.65E-06

(a) Concentration in soil is the 95 percent upper confidence limit on the arithmetic mean of surface soil data (samples less than 2 feet deep). Non-detects are replaced with one-half the detection level for calculating the soil concentration.

(b) – Unless otherwise noted, the concentration in groundwater is the 95 percent upper confidence limit on the arithmetic mean of groundwater data. Non-detects are replaced with one-half the detection level for calculating the groundwater concentration.

(c) – The 95 percent upper confidence limit on the arithmetic mean exceeds the maximum detected concentration; therefore, the maximum detected concentration is used.

"--" – Not calculated because contaminant is not considered a carcinogen or potency factor is not available.

"xx" – Quantitative information on uptake factors not available.

"ND" – Not detected.

"NA" – Not analyzed.

* – Replaces original Table 6-191 in the Final Baseline RA; Dames & Moore, 1992a.

TABLE 6-202*

Estimated Contaminant Concentrations in Soil and Estimated Human Intakes Due to Incidental Ingestion of Soil at Site 26 Future Residential Land Use Scenario

Analyte	Exposure Point Concentration (mg/kg)(a)	Carcinogenic Intake (mg/kg/day)	Noncarcinogenic Intake (mg/kg/day)
Lead	469	--	1.71E-03
Silver	0.874 (b)	--	3.19E-06
Zinc	188	--	6.87E-04

(a) – Exposure point concentration is the 95 percent upper confidence limit on the arithmetic mean of surface soil data (samples less than 2 feet deep). Non-detects are replaced with one-half the detection level for calculating exposure point concentration.

(b) – The 95 percent upper confidence limit on the arithmetic mean exceeds the maximum detected concentration; therefore, the maximum detected concentration is used as the exposure point concentration (USEPA, 1989b).

"--" – Not calculated because contaminant is not considered a carcinogen or potency factor is not available.

* – Replaces original Table 6-202 in the Final Baseline RA; Dames & Moore, 1992a.

TABLE 6-203*

Estimated Contaminant Concentrations in Air and Estimated Human Intakes Due to Inhalation of Dust at Site 26 Future Residential Land Use Scenario

Source-Related Dust Concentration for Site 26 is 0.00194 mg/m3 (see Appendix E)

Analyte	Concentration in Soil (mg/kg)(a)	Exposure Point Concentration (mg/m3)(b)	Carcinogenic Intake (mg/kg/day)	Noncarcinogenic Intake (mg/kg/day)
Lead	469	9.08E-07	--	2.49E-07
Silver	0.874 (c)	1.69E-09	--	4.64E-10
Zinc	188	3.64E-07	--	9.97E-08

(a) – Concentration in soil is the 95 percent upper confidence limit on the arithmetic mean of surface soil data (samples less than 2 feet deep). Non-detects are replaced with one-half the detection level for calculating the soil concentration.

(b) – The exposure point concentration is the product of the total source-related dust concentration and the contaminant concentration in surface soil. The assumption is made that the contaminants are distributed in the air in the same proportion as they are in the surface soil.

(c) – The 95 percent upper confidence limit on the arithmetic mean exceeds the maximum detected concentration; therefore, the maximum detected concentration is used as the exposure point concentration (USEPA, 1989b).

"--" – Not calculated because contaminant is not considered a carcinogen or potency factor is not available.

* – Replaces original Table 6-203 in the Final Baseline RA; Dames & Moore, 1992a.

TABLE 6–204*

Estimated Contaminant Concentrations in Crops and Estimated Human Intakes of Contaminants Due to Consumption of Crops at Site 26
Future Residential Land Use Scenario

Analyte	Concentration in Soil (a) (mg/kg)	Concentration in Water (b) (ug/l)	Concentration in Crops (mg/kg)	Carcinogenic Intake (mg/kg/day)	Noncarcinogenic Intake (mg/kg/day)
Lead	469	NA	2.35E+00	--	2.57E–03
Silver	0.874 (c)	NA	xx	--	xx
Zinc	188	NA	xx	--	xx

(a) Concentration in soil is the 95 percent upper confidence limit on the arithmetic mean of surface soil data (samples less than 2 feet deep). Non–detects are replaced with one–half the detection level for calculating the soil concentration.

(b) Concentration in groundwater is the 95 percent upper confidence limit on the arithmetic mean of groundwater data. Non–detects are replaced with one–half the detection level for calculating the groundwater concentration.

(c) – The 95 percent upper confidence limit on the arithmetic mean exceeds the maximum detected concentration; therefore, the maximum detected concentration is used as the exposure point concentration (USEPA, 1989b).

"--" – Not calculated because contaminant is not considered a carcinogen or potency factor is not available.

"xx" – Quantitative information on uptake factors not available.

"NA" – Not applicable because groundwater samples were not collected at this site.

* – Replaces original Table 6–204 in the Final Baseline RA; Dames & Moore, 1992a.

TABLE 6–220*

Estimated Contaminant Concentrations in Soil and Estimated Human Intakes Due to Incidental Ingestion of Soil at Site 30 Future Residential Land Use Scenario

Analyte	Exposure Point Concentration (mg/kg)(a)	Carcinogenic Intake (mg/kg/day)	Noncarcinogenic Intake (mg/kg/day)
Lead	190 (b)	--	6.94E-04
Silver	0.699	--	2.55E-06
Zinc	319	--	1.17E-03
DDD	0.201	3.15E-07	7.34E-07
DDE	0.042	6.58E-08	1.53E-07
DDT	0.485	7.59E-07	1.77E-06

(a) – Unless otherwise noted, the exposure point concentration is the 95 percent upper confidence limit on the arithmetic mean of surface soil data (samples less than 2 feet deep). Non–detects are replaced with one–half the detection level for calculating the exposure point concentration.

(b) – The 95 percent upper confidence limit on the arithmetic mean exceeds the maximum detected concentration; therefore, the maximum detected concentration is used as the exposure point concentration.

"--" – Not calculated because contaminant is not considered a carcinogen or potency factor is not available.

* – Replaces original Table 6–220 in the Final Baseline RA; Dames & Moore, 1992a.

TABLE 6-221*

Estimated Contaminant Concentrations in Air and Estimated Human Intakes Due to Inhalation of Dust at Site 30 Future Residential Land Use Scenario

Source-Related Dust Concentration for Site 30 is 0.000702 mg/m3 (see Appendix E)

Analyte	Concentration in Soil (mg/kg)(a)	Exposure Point Concentration (mg/m3)(b)	Carcinogenic Intake (mg/kg/day)	Noncarcinogenic Intake (mg/kg/day)
Lead	190 (b)	1.33E-07	--	3.65E-08
Silver	0.699	4.91E-10	--	1.34E-10
Zinc	319	2.24E-07	--	6.14E-08
DDD	0.201	1.41E-10	1.66E-11	3.87E-11
DDE	0.042	2.95E-11	3.46E-12	8.08E-12
DDT	0.485	3.40E-10	4.00E-11	9.33E-11

(a) – Unless otherwise noted, the concentration in soil is the 95 percent upper confidence limit on the arithmetic mean of surface soil data (samples less than 2 feet deep). Non-detects are replaced with one-half the detection level for calculating the soil concentration.

(b) – The exposure point concentration is the product of the total source-related dust concentration and the contaminant concentration in surface soil. The assumption is made that the contaminants are distributed in the air in the same proportion as they are in the surface soil.

(c) – The 95 percent upper confidence limit on the arithmetic mean exeeds the maximum detected concentration; therefore, the maximum detected concentration is used.

"--" – Not calculated because contaminant is not considered a carcinogen or potency factor is not available.

* – Replaces original Table 6-221 in the Final Baseline RA; Dames & Moore, 1992a.

TABLE 6-222*

Estimated Contaminant Concentrations in Crops and Estimated Human Intakes of Contaminants Due to Consumption of Crops at Site 30 Future Residential Land Use Scenario

Analyte	Concentration in Soil (a) (mg/kg)	Concentration in Water (b) (ug/l)	Concentration in Crops (mg/kg)	Carcinogenic Intake (mg/kg/day)	Noncarcinogenic Intake (mg/kg/day)
Lead	190 (c)	NA	9.50E-01	--	1.04E-03
Silver	0.699	NA	xx	--	xx
Zinc	319	NA	xx	--	xx
DDD	0.201	NA	4.76E-03	2.24E-06	5.22E-06
DDE	0.042	NA	8.36E-04	3.93E-07	9.17E-07
DDT	0.485	NA	3.96E-03	1.86E-06	4.34E-06

(a) – Unless otherwise noted, the concentration in soil is the 95 percent upper confidence limit on the arithmetic mean of surface soil data (samples less than 2 feet deep). Non-detects are replaced with one-half the detection level for calculating the soil concentration.

(b) – Unless otherwise noted, the concentration in groundwater is the 95 percent upper confidence limit on the arithmetic mean of groundwater data. Non-detects are replaced with one-half the detection level for calculating the groundwater concentration.

(c) – The 95 percent upper confidence limit on the arithmetic mean exceeds the maximum detected concentration; therefore, the maximum detected concentration is used.

"--" – Not calculated because contaminant is not considered a carcinogen or potency factor is not available.

"xx" – Quantitative information on uptake factors not available.

"NA" – Not applicable because groundwater samples were not collected at this site.

* – Replaces original Table 6-222 in the Final Baseline RA; Dames & Moore, 1992a.

TABLE 6-223*

Estimated Contaminant Concentrations in Soil and Estimated Human Intakes Due to Incidental Ingestion of Soil at Site 48 Future Residential Land Use Scenario

Analyte	Exposure Point Concentration (mg/kg)(a)	Carcinogenic Intake (mg/kg/day)	Noncarcinogenic Intake (mg/kg/day)
Cadmium	4.47	--	1.63E-05
Copper	82.7	--	3.02E-04
Lead	85.1	--	3.11E-04
Mercury	0.558	--	2.04E-06
Silver	2.13	--	7.78E-06
Zinc	343	--	1.25E-03
Nitrite/nitrate	20 (b)	--	7.31E-05
DDD	4.83	7.56E-06	1.76E-05
DDE	1.24	1.94E-06	4.53E-06
DDT	1.03	1.61E-06	3.76E-06

(a) Upper 95 percent confidence limit on the arithmetic mean. Calculated assuming one-half the detection level as the concentration for those samples in which a given analyte was not detected.

(b) - The 95 percent upper confidence limit on the arithmetic mean exceeds the maximum detected concentration; therefore, the maximum detected concentration is used as the exposure point concentration.

"--" - Not calculated because contaminant is not considered a carcinogen or potency factor is not available.

* - Replaces original Table 6-223 in the Final Baseline RA; Dames & Moore, 1992a.

TABLE 6-224*

Estimated Contaminant Concentrations in Air and Estimated Human Intakes Due to Inhalation of Dust at Site 48 Future Residential Land Use Scenario

Source-Related Dust Concentration for Site 48 is 0.000702 mg/m3 (see Appendix E)

Analyte	Concentration in Soil (mg/kg)(a)	Exposure Point Concentration (mg/m3)(b)	Carcinogenic Intake (mg/kg/day)	Noncarcinogenic Intake (mg/kg/day)
Cadmium	4.47	3.14E-09	3.68E-10	8.60E-10
Copper	82.7	5.81E-08	--	1.59E-08
Lead	85.1	5.97E-08	--	1.64E-08
Mercury	0.558	3.92E-10	--	1.07E-10
Silver	2.13	1.50E-09	--	4.10E-10
Zinc	343	2.41E-07	--	6.60E-08
Nitrite/nitrate	20 (c)	1.40E-08	--	3.85E-09
DDD	4.83	3.39E-09	3.98E-10	9.29E-10
DDE	1.24	8.70E-10	1.02E-10	2.38E-10
DDT	1.03	7.23E-10	8.49E-11	1.98E-10

(a) – Upper 95 percent upper confidence limit on the aithmetic mean. Calculated assuming one-half the detection level as the concentration for those samples in which a given analyte was not detected.

(b) – The exposure point concentration is the product of the total source-related dust concentration and the contaminant concentration in surface soil. The assumption is made that the contaminants are distributed in the air in the same proportion as they are in the surface soil.

(c) – The 95 percent upper confidence limit on the arithmetic mean exceeds the maximum detected concentration; therefore, the maximum detected concentration is used.

"--" – Not calculated because contaminant is not considered a carcinogen or potency factor is not available.

* – Replaces original Table 6-224 in the Final Baseline RA; Dames & Moore, 1992a.

TABLE 6-225*

Estimated Contaminant Concentrations in Crops and Estimated Human Intakes of Contaminants Due to Consumption of Crops at Site 48 Future Residential Land Use Scenario

Analyte	Concentration in Soil (a) (mg/kg)	Concentration in Water (b) (ug/l)	Concentration in Crops (mg/kg)	Carcinogenic Intake (mg/kg/day)	Noncarcinogenic Intake (mg/kg/day)
Cadmium	4.47	NA	2.68E-01	--	2.94E-04
Copper	82.7	NA	XX	--	xx
Lead	85.1	NA	4.26E-01	--	4.66E-04
Mercury	0.558	NA	5.02E-02	--	5.50E-05
Silver	2.13	NA	XX	--	xx
Zinc	343	NA	XX	--	xx
Nitrite/nitrate	20 (c)	NA	XX	--	xx
DDD	4.83	NA	1.14E-01	5.37E-05	1.25E-04
DDE	1.24	NA	2.47E-02	1.16E-05	2.71E-05
DDT	1.03	NA	8.41E-03	3.95E-06	9.22E-06

(a) – Upper 95 percent confidence limit on the arithmetic mean. Calculated assuming one-half the detection level as the concentration for those samples in which a given analyte was not detected.

(b) – Unless otherwise noted, the concentration in groundwater is the 95 percent upper confidence limit on the arithmetic mean of groundwater data. Non-detects are replaced with one-half the detection level for calculating the groundwater concentration.

(c) – The 95 percent upper confidence limit on the arithmetic mean exceeds the maximum detected concentration; therefore, the maximum detected concentration is used.

"--" – Not calculated because contaminant is not considered a carcinogen or potency factor is not available.

"xx" – Quantitative information on uptake factors not available.

"NA" – Not applicable because groundwater samples were not collected at this site.

* – Replaces original Table 6-225 in the Final Baseline RA; Dames & Moore, 1992a.

ingestion (pathway 12), respectively, for the future residential land use scenario at followup fieldwork Site 48.

The soil concentration used is the 95 percent UCL on the arithmetic mean of surface soil data (to a depth of 2 feet) for Site 48, obtained from Table 3-82*.

6.5.2.7* Operable Unit G: Active Landfill (Site 11). Tables 6-226* through 6-228* present estimated exposure point concentrations and carcinogenic and noncarcinogenic intakes for groundwater ingestion (pathway 5), dermal absorption of contaminants in groundwater (pathway 7), and crop ingestion (pathway 12), respectively, for the future residential land use scenario at followup fieldwork Site 11.

The groundwater concentration used is the 95 percent UCL on the arithmetic mean of groundwater data for Site 11, obtained from Table 3-83*.

6.5.2.8* Operable Unit H: Defense Re-utilization Marketing Office and Other Administration Area Sites

6.5.2.8.1* Site 22: DRMO Area. Tables 6-229* through 6-231* present estimated exposure point concentrations and carcinogenic and noncarcinogenic intakes for incidental soil ingestion (pathway 2), dust inhalation (pathway 3), and crop ingestion (pathway 12), respectively, for the future residential land use scenario at followup fieldwork Site 22.

The soil concentration used is the 95 percent UCL on the arithmetic mean of surface soil data (to a depth of 2 feet) for Site 22, obtained from Table 3-84*.

6.5.2.8.2A Site 44: Road Oil Application/Disposal Location II. Tables 6-234A and 6-234B present estimated exposure point concentrations and carcinogenic and noncarcinogenic intakes for incidental soil ingestion (pathway 2) and dust inhalation (pathway 3), respectively, for the future residential land use scenario at followup fieldwork Site 44 Location II. Table 6-234C presents the estimated soil concentration, crop concentration, and carcinogenic and noncarcinogenic intakes for crop ingestion (pathway 12) for the future residential land use scenario at Site 44 Location II. Groundwater samples were not collected at this site.

TABLE 6-226*

Estimated Contaminant Concentrations in Groundwater and Estimated Human Intakes Due to Ingestion of Groundwater at Site 11 Future Residential Land Use Scenario

Analyte	Exposure Point Concentration (ug/l)(a)	Carcinogenic Intake (mg/kg/day)	Noncarcinogenic Intake (mg/kg/day)
Antimony	3.3	--	9.04E-05
Arsenic	7.51	8.82E-05	2.06E-04
Barium	67.5	--	1.85E-03
Chromium	16.3	--	4.47E-04
Copper	13.9	--	3.81E-04
Lead	2.930	--	8.03E-05
Selenium	34.2	--	9.37E-04
Vanadium	54.7	--	1.50E-03
Zinc	26.5	--	7.26E-04
Cyanide	6.36	--	1.74E-04
24DNT	3.37	3.96E-05	9.23E-05
26DNT	0.92 (b)	1.08E-05	2.51E-05
RDX	1.03	1.21E-05	2.82E-05
Tetryl	0.627	--	1.72E-05

(a) – Exposure point concentration is the 95 percent upper confidence limit on the arithmetic mean of groundwater data. Non-detects are replaced with one-half the detection level for calculating exposure point concentration.

(b) – The 95 percent upper confidence limit on the arithmetic mean exceeds the maximum detected concentration; therefore, the maximum detected concentration is used as the exposure point concentration (USEPA, 1989b).

"--" Not calculated because contaminant is not considered a carcinogen or potency factor is not available.

* – Replaces original Table 6-226 in the Final Baseline RA; Dames & Moore, 1992a.

TABLE 6-227*

Estimated Contaminant Concentrations in Groundwater and Estimated Human Intakes Due to Dermal Absorption of Groundwater Contaminants at Site 11 Future Residential Land Use Scenario

Analyte	Exposure Point Concentration (ug/l)(a)	Permeability Coefficient (Kp)(cm/hr)	Carcinogenic Intake (mg/kg/day)	Noncarcinogenic Intake (mg/kg/day)
24DNT	3.37	3.8E-03	2.56E-07	5.96E-07
26DNT	0.92 (b)	3.2E-03	5.86E-08	1.37E-07
RDX	1.03	3.5E-04	7.20E-09	1.68E-08
Tetryl	0.627	5.0E-04	--	1.46E-08

(a) – Exposure point concentration is the 95 percent upper confidence limit on the arithmetic mean of groundwater data. Non-detects are replaced with one-half the detection level for calculating exposure point concentration.

(b) – The 95 percent upper confidence limit on the arithmetic mean exceeds the maximum detected concentration; therefore, the maximum detected concentration is used as the exposure point concentration (USEPA, 1989b).

"--" – Not calculated because contaminant is not considered a carcinogen or potency factor is not available.

* – Replaces original Table 6-227 in the Final Baseline RA; Dames & Moore, 1992a.

TABLE 6-228*

Estimated Contaminant Concentrations in Crops and Estimated Human Intakes of Contaminants Due to Consumption of Crops at Site 11 Future Residential Land Use Scenario

Analyte	Concentration in Soil (a) (mg/kg)	Concentration in Water (b) (ug/l)	Concentration in Crops (mg/kg)	Carcinogenic Intake (mg/kg/day)	Noncarcinogenic Intake (mg/kg/day)
Antimony	NA	3.3	xx	--	xx
Arsenic	NA	7.51	3.00E-05	1.41E-08	3.29E-08
Barium	NA	67.5	xx	--	xx
Chromium	NA	16.3	1.63E-05	--	1.79E-08
Copper	NA	13.9	xx	--	xx
Lead	NA	2.93	1.47E-05	--	1.61E-08
Selenium	NA	34.2	xx	--	xx
Vanadium	NA	54.7	xx	--	xx
Zinc	NA	26.5	xx	--	xx
Cyanide	NA	6.36	xx	--	xx
24DNT	NA	3.37	1.07E-02	5.04E-06	1.18E-05
26DNT	NA	0.917 (c)	2.95E-03	1.38E-06	3.23E-06
RDX	NA	1.03	3.71E-03	1.74E-06	4.06E-06
Tetryl	NA	0.627	2.07E-03	--	2.27E-06

(a) Concentration in soil is the 95 percent upper confidence limit on the arithmetic mean of surface soil data (samples less than 2 feet deep). Non-detects are replaced with one-half the detection level for calculating the soil concentration.

(b) Concentration in groundwater is the 95 percent upper confidence limit on the arithmetic mean of groundwater data. Non-detects are replaced with one-half the detection level for calculating the groundwater concentration.

(c) - The 95 percent upper confidence limit of the arithmetic mean exceeds the maximum detected concentration; therefore, the maximum detected concentration is used as the exposure point concentration (USEPA, 1989b).

"--" - Not calculated because contaminant is not considered a carcinogen or potency factor is not available.

"xx" - Quantitative information on uptake factors not available.

"NA" - Not analyzed

* - Replaces original Table 6-228 in the Final Baseline RA; Dames & Moore, 1992a.

TABLE 6-229*

Estimated Contaminant Concentrations in Soil and Estimated Human Intakes Due to Incidental Ingestion of Soil at Site 22 Future Residential Land Use Scenario

Analyte	Exposure Point Concentration (mg/kg)(a)	Carcinogenic Intake (mg/kg/day)	Noncarcinogenic Intake (mg/kg/day)
Antimony	32.8	–	1.20E-04
Barium	126	–	4.60E-04
Beryllium	0.999	1.56E-06	3.65E-06
Cadmium	10.2	–	3.73E-05
Copper	739	–	2.70E-03
Lead	979	–	3.58E-03
Mercury	0.171	–	6.25E-07
Potassium	1520	–	5.55E-03
Silver	0.157	–	5.74E-07
Thallium	18.100	–	6.61E-05
Zinc	534	–	1.95E-03
DDD	0.039	6.11E-08	1.42E-07
DDE	0.05	7.83E-08	1.83E-07
DDT	0.129	2.02E-07	4.71E-07

(a) - Exposure point concentration is the 95 percent upper confidence limit on the arithmetic mean of surface soil data (samples less than 2 feet deep). Non-detects are replaced with one-half the detection level for calculating exposure point concentration.

"–" - Not calculated because contaminant is not considered a carcinogen or potency factor is not available.

* - Replaces original Table 6-229 in the Final Baseline RA; Dames & Moore, 1992a.

TABLE 6-230*

Estimated Contaminant Concentrations in Air and Estimated Human Intakes Due to Inhalation of Dust at Site 22 Future Residential Land Use Scenario

Source-Related Dust Concentration for Site 22 is 0.00159 mg/m3 (see Appendix E)

Analyte	Concentration in Soil (mg/kg)(a)	Exposure Point Concentration (mg/m3)(b)	Carcinogenic Intake (mg/kg/day)	Noncarcinogenic Intake (mg/kg/day)
Antimony	32.8	5.21E-08	--	1.43E-08
Barium	126	2.00E-07	--	5.49E-08
Beryllium	0.999	1.59E-09	1.86E-10	4.35E-10
Cadmium	10.2	1.62E-08	1.90E-09	4.44E-09
Copper	739	1.17E-06	--	3.22E-07
Lead	979	1.56E-06	--	4.26E-07
Mercury	0.171	2.72E-10	--	7.44E-11
Potassium	1520	2.42E-06	--	6.62E-07
Silver	0.157	2.49E-10	--	6.83E-11
Thallium	18.100	2.88E-08	--	7.88E-09
Zinc	534	8.49E-07	--	2.32E-07
DDD	0.039	6.20E-11	7.28E-12	1.70E-11
DDE	0.05	7.95E-11	9.33E-12	2.18E-11
DDT	0.129	2.05E-10	2.41E-11	5.62E-11

(a) - Concentration in soil is the 95 percent upper confidence limit on the arithmetic mean of surface soil data (samples less than 2 feet deep). Non-detects are replaced with one-half the detection level for calculating the soil concentration.

(b) - The exposure point concentration is the product of the total source-related dust concentration and the contaminant concentration in surface soil. The assumption is made that the contaminants are distributed in the air in the same proportion as they are in the surface soil.

"--" - Not calculated because contaminant is not considered a carcinogen or potency factor is not available.

* - Replaces original Table 6-230 in the Final Baseline RA; Dames & Moore, 1992a.

TABLE 6-231*

Estimated Contaminant Concentrations in Crops and Estimated Human Intakes of Contaminants Due to Consumption of Crops at Site 22 Future Residential Land Use Scenario

Analyte	Concentration in Soil (a) (mg/kg)	Concentration in Water (b) (ug/l)	Concentration in Crops (mg/kg)	Carcinogenic Intake (mg/kg/day)	Noncarcinogenic Intake (mg/kg/day)
Antimony	32.8	NA	xx	–	xx
Barium	126	NA	xx	–	xx
Beryllium	0.999	NA	9.99E-04	4.69E-07	1.09E-06
Cadmium	10.2	NA	6.12E-01	–	6.71E-04
Copper	739	NA	xx	–	xx
Lead	979	NA	4.90E+00	–	5.36E-03
Mercury	0.171	NA	1.54E-02	–	1.69E-05
Potassium	1520	NA	xx	–	xx
Silver	0.157	NA	xx	–	xx
Thallium	18.1	NA	xx	–	xx
Zinc	534	NA	xx	–	xx
DDD	0.039	NA	9.23E-04	4.34E-07	1.01E-06
DDE	0.05	NA	9.96E-04	4.68E-07	1.09E-06
DDT	0.129	NA	1.05E-03	4.95E-07	1.15E-06

(a) Concentration in soil is the 95 percent upper confidence limit on the arithmetic mean of surface soil data (samples less than 2 feet deep). Non-detects are replaced with one-half the detection level for calculating the soil concentration.

(b) Concentration in groundwater is the 95 percent upper confidence limit on the arithmetic mean of groundwater data. Non-detects are replaced with one-half the detection level for calculating the groundwater concentration.

"–" - Not calculated because contaminant is not considered a carcinogen or potency factor is not available.

"xx" - Quantitative information on uptake factors not available.

"NA" - Not applicable because groundwater samples were not collected at this site.

* - Replaces original Table 6-231 in the Final Baseline RA; Dames & Moore, 1992a.

TABLE 6-234A

Estimated Contaminant Concentrations in Soil and Estimated Human Intakes Due to Incidental Ingestion of Soil at Site 44, Location II Future Residential Land Use Scenario

Analyte	Exposure Point Concentration (mg/kg)(a)	Carcinogenic Intake (mg/kg/day)	Noncarcinogenic Intake (mg/kg/day)
Lead	6.76	--	2.47E-05
Silver	0.687	--	2.51E-06

(a) - Exposure point concentration is the 95 percent upper confidence limit on the arithmetic mean of surface soil data (samples less than 2 feet deep). Non-detects are replaced with one-half the detection level for calculating exposure point concentration.

"--" - Not calculated because contaminant is not considered a carcinogen or potency factor is not available.

TABLE 6-234B

Estimated Contaminant Concentrations in Air and Estimated Human Intakes Due to Inhalation of Dust at Site 44, Location II Future Residential Land Use Scenario

Source-Related Dust Concentration for Site 44 is 0.005181 mg/m3 (see Appendix E)

Analyte	Concentration in Soil (mg/kg)(a)	Exposure Point Concentration (mg/m3)(b)	Carcinogenic Intake (mg/kg/day)	Noncarcinogenic Intake (mg/kg/day)
Lead	6.76	3.50E-08	--	9.60E-09
Silver	0.687	3.56E-09	--	9.75E-10

(a) - Concentration in soil is the 95 percent upper confidence limit on the arithmetic mean of surface soil data (samples less than 2 feet deep). Non-detects are replaced with one-half the detection level for calculating the soil concentration.

(b) - The exposure point concentration is the product of the total source-related dust concentration and the contaminant concentration in surface soil. The assumption is made that the contaminants are distributed in the air in the same proportion as they are in the surface soil.

"--" - Not calculated because contaminant is not considered a carcinogen or potency factor is not available.

TABLE 6-234C

Estimated Contaminant Concentrations in Crops and Estimated Human Intakes of Contaminants Due to Consumption of Crops at Site 44, Location II
Future Residential Land Use Scenario

Analyte	Concentration in Soil (a) (mg/kg)	Concentration in Water (b) (ug/l)	Concentration in Crops (mg/kg)	Carcinogenic Intake (mg/kg/day)	Noncarcinogenic Intake (mg/kg/day)
Lead	6.76	NA	3.38E-02	--	3.70E-05
Silver	0.687	NA	xx	--	xx

(a) Concentration in soil is the 95 percent upper confidence limit on the arithmetic mean of surface soil data (samples less than 2 feet deep). Non-detects are replaced with one-half the detection level for calculating the soil concentration.

(b) Concentration in groundwater is the 95 percent upper confidence limit on the arithmetic mean of groundwater data. Non-detects are replaced with one-half the detection level for calculating the groundwater concentration.

"--" - Not calculated because contaminant is not considered a carcinogen or potency factor is not available.

"xx" - Quantitative information on uptake factors not available.

"ND" - Not detected.

"NA" - Not applicable because groundwater samples were not collected at this site.

The soil concentration used is the 95 percent UCL on the arithmetic mean of surface soil data (to a depth of a feet) for Site 44 Location II, obtained from Table 3-86*.

6.5.2.10* Operable Unit J: Miscellaneous UMDA Sites

6.5.2.10.1A Site 2: Storage Igloos. Tables 6-237A and 6-237B present estimated exposure point concentrations and carcinogenic and noncarcinogenic intakes for incidental soil ingestion (pathway 2) and dust inhalation (pathway 3), respectively, for the future residential land use scenario at followup fieldwork Site 2. Table 6-237C presents the estimated soil concentration, crop concentration, and carcinogenic and noncarcinogenic intakes for crop ingestion (pathway 12) for the future residential land use scenario at Site 2. Groundwater samples were not collected at this site.

Soil samples were collected throughout the base at various storage igloos, but detected concentrations exceeded comparison criteria in only one sample (between storage igloo blocks H1641 and H1642). For this reason, the concentrations detected in this one soil sample are used for the exposure point concentrations.

TABLE 6-237A

Estimated Contaminant Concentrations in Soil and Estimated Human Intakes
Due to Incidental Ingestion of Soil
Between Storage Igloos H1641 and H1642 at Site 2
Future Residential Land Use Scenario

Analyte	Exposure Point Concentration (mg/kg)(a)	Carcinogenic Intake (mg/kg/day)	Noncarcinogenic Intake (mg/kg/day)
Chromium	252	--	9.21E-04
Lead	1700	--	6.21E-03
Zinc	411	--	1.50E-03

(a) - Because only one soil sample was collected the detected concentration is used for the exposure point concentration.

"--" - Not calculated because contaminant is not considered a carcinogen or potency factor is not available.

TABLE 6-237B

Estimated Contaminant Concentrations in Air and Estimated Human Intakes Due to Inhalation of Dust Between Storage Igloos H1641 and H1642 at Site 2 Future Residential Land Use Scenario

Source-Related Dust Concentration for Site 2 is 0.000731 mg/m3 (see Appendix E)

Analyte	Concentration in Soil (mg/kg)(a)	Exposure Point Concentration (mg/m3)(b)	Carcinogenic Intake (mg/kg/day)	Noncarcinogenic Intake (mg/kg/day)
Chromium	252	1.84E-07	2.16E-08	5.05E-08
Lead	1700	1.24E-06	--	3.40E-07
Zinc	411	3.00E-07	--	8.23E-08

(a) – Because only one sample was collected the detected concentration is used for the exposure point concentration.

(b) – The exposure point concentration is the product of the total source-related dust concentration and the contaminant concentration in surface soil. The assumption is made that the contaminants are distributed in the air in the same proportion as they are in the surface soil.

"--" – Not calculated because contaminant is not considered a carcinogen or potency factor is not available.

TABLE 6-237C

Estimated Contaminant Concentrations in Crops and Estimated Human Intakes of Contaminants Due to Consumption of Crops Between Storage Igloos H1641 and H1642 at Site 2 Future Residential Land Use Scenario

Analyte	Concentration in Soil (a) (mg/kg)	Concentration in Water (ug/l)	Concentration in Crops (mg/kg)	Carcinogenic Intake (mg/kg/day)	Noncarcinogenic Intake (mg/kg/day)
Chromium	252	NA	2.52E-01	--	2.76E-04
Lead	1700	NA	8.50E+00	--	9.32E-03
Zinc	411	NA	xx	--	xx

(a) Because only one soil sample was collected the detected concentration is used for the exposure point concentration.

"--" – Not calculated because contaminant is not considered a carcinogen or potency factor is not available.

"xx" – Quantitative information on uptake factors not available.

"ND" – Not detected.

"NA" – Not applicable because groundwater samples were not collected at this site.

7.0* RISK CHARACTERIZATION

The methodology used to estimate potential carcinogenic risks at low and high risk levels and to estimate noncarcinogenic human health hazards is discussed in detail in Section 7.1 of the Baseline RA and is not repeated in this addendum.

7.2* CURRENT LAND USE SCENARIO

7.2.1* Worker Near Explosives Washout Area at Building 419

As discussed in Section 6.2.1.3*, the worker near the explosives washout area at Building 419, near Operable Unit A sites, may inhale windborne contaminated dust from these and other sites at UMDA. As detailed in Section 6.5.1.1*, contaminated dust--primarily from 19 sites located in Operable Units A, B, D, E, and J (Sites 4, 9, 16, 21, 31, 38, 39, 52, 57 (Locations II and III), 60 and 67, and followup fieldwork Sites 5, 15, 18, 19, 26, 36, and 47)--is considered in determining exposure point concentrations and intakes for this receptor. Table 7-1* presents the estimated carcinogenic intakes, noncarcinogenic intakes, potency factors, reference doses, potential risks, and potential hazards for inhalation of contaminated soil as airborne dust (pathway 3), the only pathway quantified for the worker near the explosives washout area.

Under the exposure conditions presented in Table 6-15 in the Baseline RA and including data from followup fieldwork sites, the total potential carcinogenic risk and noncarcinogenic hazard are 3E-08 and 4E-03, respectively. These results are slightly lower than those calculated in the Baseline RA (8E-08 and 8E-03, respectively).

7.2.2 Open Detonation Pit and Open Burning Tray Workers

As discussed in Section 6.2.1.3*, the OD pit and open burning tray workers may inhale contaminated dust primarily from six Operable Unit B sites (Sites 16, 32 (Location I), and 57 (Locations I and II), and followup fieldwork Sites 15 and 19). Both the detonation operations at Site 16 and the ambient wind conditions at each of the six sites may generate contaminated dust. Tables 7-2* and 7-3* present the

TABLE 7-1*

Potential Carcinogenic Risks and Noncarcinogenic Hazards Due to Inhalation of Dust
Current Land Use Scenario, Worker Near Explosives Washout Area (a)

Analyte	Carcinogenic Intake (mg/kg/day)	Slope Factor 1/(mg/kg/day)	Risk
Aluminum	--	--	--
Antimony	--	--	--
Arsenic	1.39E-10	1.4E+01	2E-09
Barium	--	--	--
Beryllium	5.69E-13	8.4E+00	5E-12
Cadmium	1.32E-09	6.3E+00	8E-09
Calcium	--	--	--
Chromium	5.04E-10	4.2E+01	2E-08
Cobalt	--	--	--
Copper	--	--	--
Cyanide	--	--	--
Iron	--	--	--
Lead	--	--	--
Magnesium	--	--	--
Manganese	--	--	--
Mercury	--	--	--
Nickel	4.01E-10	1.7E+00	7E-10
Potassium	--	--	--
Selenium	--	--	--
Silver	--	--	--
Sodium	--	--	--
Thallium	--	--	--
Zinc	--	--	--
135TNB	--	--	--
13DNB	--	--	--
246TNT	2.97E-08	--	--
24DNT	3.03E-11	--	--
26DNT	7.85E-13	--	--
HMX	--	--	--
RDX	2.34E-09	--	--
Nitrobenzene	--	--	--
Tetryl	--	--	--
Nitrate/nitrite	--	--	--
1,1,1-Trichloroethane	--	--	
Benzo(a)anthracene	6.38E-13	6.1E+00	4E-12
Benzo(b)fluoranthene	1.15E-12	6.1E+00	7E-12
Benzo(k)fluoranthene	5.89E-13	6.1E+00	4E-12
Chrysene	1.23E-12	6.1E+00	8E-12
Di-n-butyl phthalate	--	--	--
Fluoranthene	--	--	--
Napthalene	--	--	--
Phenanthrene	--	--	--
Pyrene	--	--	--
Chlordane	7.76E-13	1.3E+00	1E-12
Dieldrin	2.42E-13	1.6E+01	4E-12
DDD	6.75E-13	--	--
DDE	1.42E-12	--	--
DDT	1.32E-12	3.4E-01	4E-13
PCB 1260	8.61E-13	--	--
Total			3E-08 (b)

TABLE 7-1* (cont'd)

Potential Carcinogenic Risks and Noncarcinogenic Hazards Due to Inhalation of Dust
Current Land Use Scenario, Worker Near Explosives Washout Area (a)

Analyte	Noncarcinogenic Intake (mg/kg/day)	Reference Dose (mg/kg/day)	Hazard Quotient
Aluminum	9.12E-08	**	**
Antimony	5.40E-09	**	**
Arsenic	3.90E-10	**	**
Barium	2.66E-07	1.4E-04	2E-03
Beryllium	1.59E-12	**	**
Cadmium	3.69E-09	**	**
Calcium	5.25E-07	**	**
Chromium	1.41E-09	6.0E-07	2E-03
Cobalt	9.99E-09	2.9E-04	3E-05
Copper	2.59E-07	**	**
Cyanide	5.96E-10	**	**
Iron	7.38E-07	**	**
Lead	1.89E-08	**	**
Magnesium	1.17E-07	**	**
Manganese	2.34E-09	1.0E-04	2E-05
Mercury	1.94E-11	9.0E-05	2E-07
Nickel	1.12E-09	**	**
Potassium	9.31E-08	**	**
Selenium	2.46E-12	**	**
Silver	4.33E-09	**	**
Sodium	2.39E-07	**	**
Thallium	7.54E-11	**	**
Zinc	4.29E-07	**	**
135TNB	5.84E-10	**	**
13DNB	1.49E-12	**	**
246TNT	8.32E-08	**	**
24DNT	8.47E-11	**	**
26DNT	2.20E-12	**	**
HMX	6.38E-10	**	**
RDX	6.55E-09	**	**
Nitrobenzene	1.43E-11	6.0E-04	2E-08
Tetryl	4.23E-11	**	**
Nitrate/nitrite	9.14E-09	**	**
1,1,1-Trichloroethane	1.36E-14	3E-01	5E-14
Benzo(a)anthracene	1.79E-12	**	**
Benzo(b)fluoranthene	3.22E-12	**	**
Benzo(k)fluoranthene	1.65E-12	**	**
Chrysene	3.45E-12	**	**
Di-n-butyl phthalate	6.12E-12	**	**
Fluoranthene	2.11E-12	**	**
Napthalene	3.86E-13	**	**
Phenanthrene	4.08E-12	**	**
Pyrene	2.42E-12	**	**
Chlordane	2.17E-12	**	**
Dieldrin	6.79E-13	**	**
DDD	1.89E-12	**	**
DDE	3.98E-12	**	**
DDT	3.70E-12	**	**
PCB 1260	2.41E-12	**	**
Total			**4E-03** (b)

"--" - Not calculated because contaminant is not considered a carcinogen or potency factor is not available.
"**" - Reference dose is not available.
(a) - The following sites were included in calculating intakes, risks, and hazards for this receptor:
Sites 16, 52, 67, 4, 57 III, 21, 38, 31, 47, 60, 5, 19, 26, 36, 9, 39, 18, 57 II, 15.
(b) - Final Baseline RA results were a total carcinogenic risk of 8E-08 and a hazard index of 8E-03 (Dames & Moore, 1992a).
* - Replaces original Table 7-1 in the Final Baseline RA; Dames & Moore, 1992a.

TABLE 7-2 *

Potential Carcinogenic Risks and Noncarcinogenic Hazards Due to Inhalation of Dust Current Land Use Scenario, Open Detonation Pit Workers (a)

Analyte	Carcinogenic Intake (mg/kg/day)	Slope Factor 1/(mg/kg/day)	Risk
Aluminum	--	--	--
Antimony	--	--	--
Arsenic	3.80E-11	1.4E+01	5E-10
Barium	--	--	--
Beryllium	1.39E-13	8.4E+00	1E-12
Cadmium	3.27E-08	6.3E+00	2E-07
Chromium	7.44E-11	4.2E+01	3E-09
Cobalt	--	--	--
Copper	--	--	--
Cyanide	--	--	--
Iron	--	--	--
Lead	--	--	--
Magnesium	--	--	--
Manganese	--	--	--
Mercury	--	--	--
Nickel	1.57E-11	1.7E+00	3E-11
Potassium	--	--	--
Selenium	--	--	--
Silver	--	--	--
Sodium	--	--	--
Thallium	--	--	--
Zinc	--	--	--
135TNB	--	--	--
246TNT	1.59E-08	--	--
HMX	--	--	--
RDX	1.30E-08	--	--
24DNT	4.60E-14	--	--
26DNT	3.44E-15	--	--
Nitrobenzene	--	--	--
Tetryl	--	--	--
Nitrate/nitrite	--	--	--
Total			2E-07 (b)

Analyte	Noncarcinogenic Intake (mg/kg/day)	Reference Dose (mg/kg/day)	Hazard Quotient
Aluminum	3.17E-08	**	**
Antimony	2.36E-09	**	**
Arsenic	1.77E-10	**	**
Barium	1.96E-05	1.4E-04	1E-01
Beryllium	6.47E-13	**	**
Cadmium	1.52E-07	**	**
Chromium	3.47E-10	6.0E-07	6E-04
Cobalt	8.72E-07	2.9E-04	3E-03
Copper	5.49E-06	**	**
Cyanide	5.23E-08	**	**
Iron	7.75E-09	**	**
Lead	3.13E-09	**	**
Magnesium	1.17E-09	**	**
Manganese	1.24E-10	1.0E-04	1E-06
Mercury	2.24E-12	9.0E-05	2E-08
Nickel	7.35E-11	**	**
Potassium	6.93E-09	**	**
Selenium	2.39E-13	**	**
Silver	6.84E-08	**	**
Sodium	1.93E-09	**	**
Thallium	3.06E-11	**	
Zinc	1.52E-07	**	**
135TNB	1.00E-10	**	**
246TNT	7.42E-08	**	**
HMX	1.59E-12	**	**
RDX	6.06E-08	**	**
24DNT	2.15E-13	**	**
26DNT	1.60E-14	**	**
Nitrobenzene	8.09E-12	6.0E-04	1E-08
Tetryl	3.71E-12	**	**
Nitrate/nitrite	7.16E-07	**	**
Total			1E-01 (b)

"--" - Not calculated because contaminant is not considered a carcinogen or potency factor is not available.
"**" - Reference dose is not available.
(a) The following sites were included in calculating intakes, risks, and hazards for this receptor: Sites 16, 19, 15.
(b) - Final Baseline RA results were the same as those listed in this table.
* - Replaces original Table 7-2 in the Final Baseline RA; Dames & Moore, 1992a.

TABLE 7–3*

Potential Carcinogenic Risks and Noncarcinogenic Hazards Due to Inhalation of Dust
Current Land Use Scenario, Open Burning Tray Workers (a)

Analyte	Carcinogenic Intake (mg/kg/day)	Slope Factor 1/(mg/kg/day)	Risk
Aluminum	--	--	--
Antimony	--	--	--
Arsenic	1.86E–09	1.4E+01	3E–08
Barium	--	--	--
Beryllium	5.17E–12	8.4E+00	4E–11
Cadmium	9.18E–09	6.3E+00	6E–08
Chromium	2.92E–09	4.2E+01	1E–07
Cobalt	--	--	--
Copper	--	--	--
Cyanide	--	--	--
Iron	--	--	--
Lead	--	--	--
Magnesium	--	--	--
Manganese	--	--	--
Mercury	--	--	--
Nickel	8.39E–10	1.7E+00	1E–09
Potassium	--	--	--
Selenium	--	--	--
Silver	--	--	--
Sodium	--	--	--
Thallium	--	--	--
Zinc	--	--	--
135TNB	--	--	--
246TNT	2.66E–07	--	--
24DNT	6.82E–12	--	--
HMX	--	--	--
RDX	1.42E–09	--	--
26DNT	1.28E–13	--	--
Nitrobenzene	--	--	--
Tetryl	--	--	--
Nitrate/nitrite	--	--	--
Total			2E–07

Analyte	Noncarcinogenic Intake (mg/kg/day)	Reference Dose (mg/kg/day)	Hazard Quotient
Aluminum	1.72E–06	**	**
Antimony	1.15E–07	**	**
Arsenic	8.69E–09	**	**
Barium	3.29E–06	1.4E–04	2E–02
Beryllium	2.41E–11	**	**
Cadmium	4.28E–08	**	**
Chromium	1.36E–08	6.0E–07	2E–02
Cobalt	9.19E–08	2.9E–04	3E–04
Copper	4.53E–06	**	**
Cyanide	5.49E–09	**	**
Iron	2.89E–07	**	**
Lead	5.15E–07	**	**
Magnesium	2.71E–07	**	**
Manganese	4.62E–09	1.0E–04	5E–05
Mercury	2.17E–10	9.0E–05	2E–06
Nickel	3.92E–09	**	**
Potassium	5.02E–07	**	**
Selenium	8.91E–12	**	**
Silver	7.36E–09	**	**
Sodium	9.35E–08	**	**
Thallium	1.14E–09	**	**
Zinc	7.50E–06	**	**
135TNB	4.92E–09	**	**
246TNT	1.24E–06	**	**
24DNT	3.18E–11	**	**
HMX	5.92E–11	**	**
RDX	6.61E–09	**	**
26DNT	5.98E–13	**	**
Nitrobenzene	3.98E–10	6.0E–04	7E–07
Tetryl	2.23E–10	**	**
Nitrate/nitrite	7.73E–08	**	**
Total			5E–02

"--" – Not calculated because contaminant is not considered a carcinogen or potency factor is not available.
"**" – Reference dose is not available.
(a) – The following sites were included in calculating intakes, risks, and hazards for this receptor:
Sites 16, 19, 57 I, 32, 57 II, 15.
* – Replaces original Table 7–3 in the Final Baseline RA; Dames & Moore, 1992a.

estimated carcinogenic intakes, noncarcinogenic intakes, potency factors, reference doses, potential risks, and potential hazards for inhalation of contaminated soil as airborne dust (pathway 3) for workers at the OD pits and the open burning trays, respectively. Pathway 3 is the only pathway quantified for these receptors.

Under the exposure conditions presented in Table 6-15 in the Baseline RA and including data from the followup fieldwork sites, the total potential carcinogenic risk and noncarcinogenic hazard at the OD pits are unchanged from those calculated in the Baseline RA (2E-07 and 1E-01, respectively (Dames & Moore, 1992a)). The total potential carcinogenic risk and noncarcinogenic hazard at the open burning trays are 2E-07 and 5E-02, respectively, which are slightly lower than those calculated in the Baseline RA (6E-07 and 1E-01, respectively (Dames & Moore, 1992a)). As presented in Table 7-4*, the multiple pathway potential carcinogenic risk and noncarcinogenic hazard estimates for these workers under the assumed exposure conditions are 4E-07 and 2E-01, respectively. These results are slightly lower than those calculated in the Baseline RA (8E-07 and 2E-01, respectively (Dames & Moore, 1992a))

7.2.3* Target Range Users

Table 7-5--which presents the noncarcinogenic intakes, reference doses, and potential hazards for target range users incidentally ingesting soil at Site 60, Active Firing Range--is not included in this addendum, because Site 60 is not one of the followup fieldwork sites.

Oregon National Guard and UMDA security personnel using the target range located at Site 60 may inhale contaminated dust primarily from four Operable Unit B sites (Sites 16, 57 (Location III), and 60, and followup fieldwork Site 15). Either detonation operations at Site 16 or ambient wind conditions at any of the four sites could generate contaminated dust. Table 7-6* presents the estimated carcinogenic intakes, noncarcinogenic intakes, potency factors, reference doses, potential risks, and potential hazards for inhalation of contaminated soil as airborne dust (pathway 3).

Under the exposure conditions presented in Table 6-15 in the Baseline RA and including data from the followup fieldwork sites, the total potential carcinogenic risk

TABLE 7-4*

Multiple Pathway Potential Carcinogenic Risks and Noncarcinogenic Hazards for OD Pit/Open Burning Tray Workers -- Current Land Use Scenario

Pathway No.	Pathway Description	Risk	Hazard Index
1	Dermal Soil Absorption	NA	NA
2	Incidental Ingestion of Soil	NA	NA
3	Inhalation of Dust:		
	Open Detonation Pit	2E-07	1E-01
	Open Burning Trays	2E-07	5E-02
	Total	4E-07 (a)	2E-01 (a)

NA = Pathway not applicable or quantified for this receptor.

* - Replaces original Table 7-4 in the Final Baseline RA; Dames & Moore, 1992a.

(a) - Final Baseline RA reuits were a multiple pathway carcinogenic risk and hazard index of 8E-07 and 2E-01, respectively.

TABLE 7-6*

Potential Carcinogenic Risks and Noncarcinogenic Hazards Due to Inhalation of Dust Current Land Use Scenario, Target Range Users (a)

Analyte	Carcinogenic Intake (mg/kg/day)	Slope Factor 1/(mg/kg/day)	Risk
Antimony	–	–	–
Arsenic	8.78E-13	1.4E+01	1E-11
Barium	–	–	–
Beryllium	7.92E-15	8.4E+00	7E-14
Cadmium	9.16E-11	6.3E+00	6E-10
Chromium	3.58E-12	4.2E+01	2E-10
Cobalt	–	–	–
Copper	–	–	–
Cyanide	–	–	–
Iron	–	–	–
Lead	–	–	–
Magnesium	–	–	–
Manganese	–	–	–
Mercury	–	–	–
Nickel	1.79E-13	1.7E+00	3E-13
Potassium	–	–	–
Selenium	–	–	–
Silver	–	–	–
Sodium	–	–	–
Thallium	–	–	–
Zinc	–	–	–
135TNB	–	–	–
246TNT	2.89E-11	–	–
HMX	–	–	–
RDX	3.55E-11	–	–
24DNT	2.63E-15	–	–
26DNT	1.96E-16	–	–
Nitrate/nitrite	–	–	–
Total			7E-10 (b)

Analyte	Noncarcinogenic Intake (mg/kg/day)	Reference Dose (mg/kg/day)	Hazard Quotient
Antimony	1.29E-11	**	**
Arsenic	6.83E-12	**	**
Barium	8.92E-08	1.4E-04	6E-04
Beryllium	6.16E-14	**	**
Cadmium	7.13E-10	**	**
Chromium	2.78E-11	6.0E-07	5E-05
Cobalt	3.97E-09	2.9E-04	1E-05
Copper	2.50E-08	**	**
Cyanide	2.38E-10	**	**
Iron	7.37E-10	**	**
Lead	6.93E-10	**	**
Magnesium	1.11E-10	**	**
Manganese	1.18E-11	1.0E-04	1E-07
Mercury	1.05E-13	9.0E-05	1E-09
Nickel	1.39E-12	**	**
Potassium	3.74E-09	**	**
Selenium	2.27E-14	**	**
Silver	6.70E-10	**	**
Sodium	1.17E-11	**	**
Thallium	2.91E-12	**	**
Zinc	1.06E-08	**	**
135TNB	3.99E-14	**	**
246TNT	2.25E-10	**	**
HMX	1.51E-13	**	**
RDX	2.76E-10	**	**
24DNT	2.04E-14	**	**
26DNT	1.53E-15	**	**
Nitrate/nitrite	3.26E-09	**	**
Total			7E-04 (b)

"–" - Not calculated because contaminant is not considered a carcinogen or potency factor is not available.
"**" - Reference dose is not available.
(a) - The following sites were included in calculatin intakes, risks, and hazards for this receptor: Sites 16, 60, 57 III, 15.
(b) - Final Baseline RA results were a total carcinogenic risk of 1E-09 and a hazard index of 8E-04 (Dames & Moore, 1992a).
* - Replaces original Table 7-6 in the Final Baseline RA; Dames & Moore, 1992a.

and noncarcinogenic hazard for target range users via dust inhalation are 7E-10 and 7E-04, respectively. These results are slightly lower than those calculated in the Baseline RA (1E-09 and 8E-04, respectively (Dames & Moore, 1992a)). As presented in Table 7-7*, the multiple pathway potential carcinogenic risk and noncarcinogenic hazard estimates for the target range users under the current assumed exposure conditions are 7E-10 and 7E-04, respectively, which are slightly lower than those calculated in the Baseline RA (1E-09 and 8E-04, respectively (Dames & Moore, 1992a)).

7.2.4* Worker in Southwest Warehouse Area

Tables 7-8 and 7-9--which present the carcinogenic intakes, noncarcinogenic intakes, potency factors, reference doses, potential risks, and potential hazards for the worker in the southwest warehouse area who may contact contaminated soil at Sites 37 and 46 and incidentally ingest contaminants of concern--are not included in this addendum, because these two sites are not part of the followup field investigation.

As discussed in Section 6.2.1.3*, the worker in the southwest warehouse area may inhale contaminated dust primarily from eight sites located in Operable Units B and E (Sites 1, 16, 21, 37, 46, and 57 (Location III), and followup fieldwork Sites 15 and 19). This risk might occur via detonation operations at Site 16 or via ambient wind conditions at any of the eight sites. Table 7-10* presents the estimated carcinogenic intakes, noncarcinogenic intakes, potency factors, reference doses, potential risks, and potential hazards for inhalation of contaminated soil as airborne dust (pathway 3).

Under the exposure conditions presented in Table 6-15 in the Baseline RA and including data from the followup fieldwork sites, the total potential carcinogenic risk and noncarcinogenic hazard are 2E-08 and 6E-03, respectively. These results are slightly lower than those calculated in the Baseline RA (3E-08 and 7E-03, respectively (Dames & Moore, 1992a)). As presented in Table 7-11*, the multiple pathway potential carcinogenic risk and noncarcinogenic hazard estimates for the worker in the southwest warehouse area under the current assumed exposure conditions are 3E-08

TABLE 7-7*

Multiple Pathway Potential Carcinogenic Risks and Noncarcinogenic Hazards for Target Range Users – Current Land Use Scenario

Pathway No.	Pathway Description	Risk	Hazard Index
2	Incidental Ingestion of Soil	–	3E-07
3	Inhalation of Dust	7E-10	7E-04
	Total	7E-10 (a)	7E-04 (a)

"–" - Not calculated because contaminants of concern were not considered carcinogens or potency factors were not available.

"NA" - Pathway not applicable to or quantified for site.

* - Replaces original Table 7-7 in the Final Baseline RA; Dames & Moore, 1992a.

(a) - Final Baseline RA results were a multiple pathway carcinogenic risk and hazard index of 1E-09 and 8E-04, respectively (Dames & Moore, 1992a).

TABLE 7-10*

Potential Carcinogenic Risks and Noncarcinogenic Hazards Due to Inhalation of Dust Current Land Use Scenario, Worker in SW Warehouse Area (a)

Analyte	Carcinogenic Intake (mg/kg/day)	Slope Factor 1/(mg/kg/day)	Risk
Aluminum	-	-	-
Antimony	-	-	-
Arsenic	3.74E-11	1.4E+01	5E-10
Barium	-	-	-
Beryllium	2.74E-12	8.4E+00	2E-11
Cadmium	1.73E-09	6.3E+00	1E-08
Chromium	3.20E-10	4.2E+01	1E-08
Cobalt	-	-	-
Copper	-	-	-
Cyanide	-	-	-
Iron	-	-	-
Lead	-	-	-
Magnesium	-	-	-
Manganese	-	-	-
Mercury	-	-	-
Nickel	3.28E-11	1.7E+00	6E-11
Potassium	-	-	-
Selenium	-	-	-
Silver	-	-	-
Sodium	-	-	-
Thallium	-	-	-
Zinc	-	-	-
135TNB	-	-	-
246TNT	4.11E-09	-	-
HMX	-	-	-
RDX	6.41E-10	-	-
24DNT	4.72E-14	-	-
26DNT	3.52E-15	-	-
Nitrobenzene	-	-	-
Tetryl	-	-	-
Nitrate/nitrite	-	-	-
Tetrachloroethylene	9.98E-15	6.0E-03	6E-17
Anthracene	-	-	-
bis(2-Ethylhexyl)phthalate	5.75E-10	-	-
Dibenzofuran	-	-	-
Di-n-butylphthalate	-	-	-
Fluoranthene	-	-	-
2-Methylnapthalene	-	-	-
Napthalene	-	-	-
N-nitrosodiphenylamine	-	-	-
Phenanthrene	-	-	-
Pyrene	-	-	-
Total			2E-08 (b)

Analyte	Noncarcinogenic Intake (mg/kg/day)	Reference Dose (mg/kg/day)	Hazard Quotient
Aluminum	1.27E-08	--	--
Antimony	1.54E-09	--	--
Arsenic	1.05E-10	--	--
Barium	5.90E-07	1.4E-04	4E-03
Beryllium	7.67E-12	--	--
Cadmium	4.83E-09	--	--
Chromium	8.95E-10	6.0E-07	1E-03
Cobalt	2.58E-08	2.9E-04	9E-05
Copper	2.59E-07	--	--
Cyanide	1.55E-09	--	--
Iron	4.77E-09	--	--
Lead	2.36E-08	--	--
Magnesium	7.17E-10	--	--
Manganese	7.63E-11	1.0E-04	8E-07
Mercury	2.95E-12	9.0E-05	3E-08
Nickel	9.20E-11	--	--
Potassium	2.21E-06	--	--
Selenium	1.47E-13	--	--
Silver	2.81E-09	--	--
Sodium	7.99E-10	--	--
Thallium	2.28E-10	--	--
Zinc	1.18E-07	--	--
135TNB	4.01E-11	--	--
246TNT	1.15E-08	--	--
HMX	9.77E-13	--	--
RDX	1.79E-09	--	--
24DNT	1.32E-13	--	--
26DNT	9.86E-15	--	--
Nitrobenzene	3.24E-12	6.0E-04	5E-09
Tetryl	1.48E-12	--	--
Nitrate/nitrite	2.12E-08	--	--
Tetrachloroethylene	2.79E-14	--	--
Anthracene	1.08E-12	--	--
bis(2-Ethylhexyl)phthalate	1.61E-09	--	--
Dibenzofuran	6.29E-12	--	--
Di-n-butylphthalate	1.41E-11	--	--
Fluoranthene	4.37E-12	--	--
2-Methylnapthalene	1.14E-11	--	--
Napthalene	1.98E-11	--	--
N-nitrosodiphenylamine	8.92E-13	--	--
Phenanthrene	9.74E-12	--	--
Pyrene	1.79E-12	--	--
Total			6E-03 (b)

"-" - Not calculated because contaminant is not considered a carcinogen or potency factor is not available.
"--" - Reference dose is not available.
(a) - The following sites were included in calculating intakes, risks, and hazards for this receptor:
Sites 16, 1, 37, 57 III, 46, 21, 19, 15.
(b) - Final Baseline RA results were a total carcinogenic risk of 3E-08 and a hazard index of 7E-03 (Dames & Moore, 1992a).
* - Replaces original Table 7-10 in the Final Baseline RA; Dames & Moore, 1992a.

TABLE 7-11*

Multiple Pathway Potential Carcinogenic Risks and Noncarcinogenic Hazards for Worker Near SW Warehouse Area -- Current Land Use Scenario

Pathway No.	Pathway Description	Risk	Hazard Index
1	Dermal Soil Absorption	NA	NA
2	Incidental Ingestion of Soil	9E-09	4E-04
3	Inhalation of Dust	2E-08	6E-03
	Total	3E-08 (a)	6E-03 (a)

"NA" - Pathway not applicable or quantified for this site.

* - Replaces original Table 7-11 in the Final Baseline RA; Dames & Moore, 1992a.

(a) - Final Baseline RA results were a multiple pathway carcinogenic risk and hazard index of 4E-08 and 6E-03, respectively (Dames & Moore, 1992a).

and 6E-03, respectively, which are less than or equal to those calculated in the Baseline RA (4E-08 and 6E-03, respectively (Dames & Moore, 1992a)).

7.2.5* Worker Near DRMO Building

Table 7-12* presents the estimated carcinogenic intakes, noncarcinogenic intakes, potency factors, reference doses, potential risks, and potential hazards for the worker near the DRMO building who may contact contaminated soil at followup fieldwork Site 22 and incidentally ingest contaminants of concern.

Under the exposure conditions presented in Table 6-15 in the Final Baseline RA and including data from the followup fieldwork sites, the total potential carcinogenic risk and noncarcinogenic hazard associated with inadvertent ingestion of contaminated soil (pathway 2) for this receptor at Site 22 are 2E-08 and 8E-03, respectively. This total carcinogenic risk is greater than the value of 7E-10 calculated previously in the Baseline RA, while the hazard index is the same as that calculated in the Baseline RA (Dames & Moore, 1992a).

As discussed in Section 6.2.1.3*, the worker near the DRMO building may inhale contaminated dust primarily from nine sites located in Operable Units B and H (Sites 16, 21, 27, 31, 38, and 57 (Location III), and followup fieldwork Sites 15, 19, and 22). This dust may be generated by detonation operations at Site 16 or by ambient wind conditions at any of the nine sites. Table 7-13* presents the estimated carcinogenic intakes, noncarcinogenic intakes, potency factors, reference doses, potential risks, and potential hazards for inhalation of contaminated soil as airborne dust (pathway 3).

Under the exposure conditions presented in Table 6-15 of the Baseline RA and including data from the followup fieldwork sites, the total potential carcinogenic risk and noncarcinogenic hazard are 9E-09 and 4E-03, respectively. These results are slightly lower than those calculated in the Baseline RA (2E-08 and 5E-03, respectively (Dames & Moore, 1992a)). As presented in Table 7-14*, the multiple pathway potential carcinogenic risk and noncarcinogenic hazard estimates for the worker near the DRMO building under the current assumed exposure conditions are 3E-08 and

TABLE 7-12*

Potential Carcinogenic Risks and Noncarcinogenic Hazards Due to Incidental Ingestion of Soil at Site 22 Current Land Use Scenario for DRMO Worker

Analyte	Carcinogenic Intake (mg/kg/day)	Slope Factor 1/(mg/kg/day)	Risk
Antimony	--	--	--
Barium	--	--	--
Beryllium	3.49E-09	4.3E+00	2E-08
Cadmium	--	--	--
Copper	--	--	--
Lead	--	--	--
Mercury	--	--	--
Potassium	--	--	--
Silver	--	--	--
Thallium	--	--	--
Zinc	--	--	--
DDD	1.36E-10	2.4E-01	3E-11
DDE	1.75E-10	3.4E-01	6E-11
DDT	4.51E-10	3.4E-01	2E-10
Total			2E-08 (a)

Analyte	Noncarcinogenic Intake (mg/kg/day)	Reference Dose (mg/kg/day)	Hazard Quotient
Antimony	8.02E-07	4.0E-04	2E-03
Barium	3.08E-06	7.0E-02	4E-05
Beryllium	2.44E-08	5.0E-03	5E-06
Cadmium	2.50E-07	1.0E-03	2E-04
Copper	1.81E-05	3.7E-02	5E-04
Lead	2.39E-05	**	**
Mercury	4.18E-09	3.0E-04	1E-05
Potassium	3.72E-05	**	**
Silver	3.84E-09	5.0E-03	8E-07
Thallium	4.43E-07	8.0E-05	6E-03
Zinc	1.31E-05	2.0E-01	7E-05
DDD	9.54E-10	**	**
DDE	1.22E-09	**	**
DDT	3.16E-09	5.0E-04	6E-06
Total			8E-03 (a)

"--" - Not calculated because contaminant is not considered a carcinogen or potency factor is not available.
"**" - Reference dose is not available.
* - Replaces original Table 7-12 in the Final Baseline RA; Dames & Moore, 1992a.
(a)-Final Baseline RA results were a total carcinogenic risk of 7E-10 and a hazard index of 8E-03 (Dames & Moore, 1992a).

TABLE 7-13*

Potential Carcinogenic Risks and Noncarcinogenic Hazards Due to Inhalation of Dust Current Land Use Scenario, Worker Near DRMO Building (a)

Analyte	Carcinogenic Intake (mg/kg/day)	Slope Factor 1/(mg/kg/day)	Risk
Aluminum	–	–	–
Antimony	–	–	–
Arsenic	2.47E-11	1.4E+01	3E-10
Barium	–	–	–
Beryllium	3.90E-11	8.4E+00	3E-10
Cadmium	8.53E-10	6.3E+00	5E-09
Chromium	5.88E-11	4.2E+01	2E-09
Cobalt	–	–	–
Copper	–	–	–
Cyanide	–	–	–
Iron	–	–	–
Lead	–	–	–
Magnesium	–	–	–
Manganese	–	–	–
Mercury	–	–	–
Nickel	2.06E-11	1.7E+00	4E-11
Potassium	–	–	–
Selenium	–	–	–
Silver	–	–	–
Sodium	–	–	–
Thallium	–	–	–
Zinc	–	–	–
135TNB	–	–	–
246TNT	4.05E-09	–	–
24DNT	7.95E-13	–	–
26DNT	1.07E-13	–	–
HMX	–	–	–
RDX	1.51E-10	–	–
Tetryl	–	–	–
Nitrobenzene	–	–	–
Nitrate/nitrite	–	–	–
Naphthalene	–	–	–
Fluoranthene	–	–	–
Phenanthrene	–	–	–
Pyrene	–	–	–
DDD	1.55E-12	–	–
DDE	2.14E-12	–	–
DDT	5.19E-12	3.4E-01	2E-12
Dieldrin	3.02E-14	1.6E+01	5E-13
Total			9E-09 (b)

Analyte	Noncarcinogenic Intake (mg/kg/day)	Reference Dose (mg/kg/day)	Hazard Quotient
Aluminum	2.77E-08	--	--
Antimony	1.11E-08	--	--
Arsenic	1.73E-10	--	--
Barium	3.90E-07	1.4E-04	3E-03
Beryllium	2.73E-10	--	--
Cadmium	5.97E-09	--	--
Chromium	4.12E-10	6.0E-07	7E-04
Cobalt	1.50E-08	2.9E-04	5E-05
Copper	3.81E-07	--	--
Cyanide	8.98E-10	--	--
Iron	2.54E-07	--	--
Lead	2.71E-07	--	--
Magnesium	1.45E-09	--	--
Manganese	1.54E-10	1.0E-04	2E-06
Mercury	4.97E-11	9.0E-05	6E-07
Nickel	1.44E-10	--	--
Potassium	4.46E-07	--	--
Selenium	2.97E-13	--	--
Silver	2.14E-09	--	--
Sodium	7.75E-08	--	--
Thallium	4.97E-09	--	--
Zinc	3.19E-07	--	--
135TNB	1.28E-10	--	--
246TNT	2.84E-08	--	--
24DNT	5.57E-12	--	--
26DNT	7.46E-13	--	--
HMX	1.98E-12	--	--
RDX	1.06E-09	--	--
Tetryl	8.52E-12	--	--
Nitrobenzene	7.07E-12	6.0E-04	1E-08
Nitrate/nitrite	1.25E-08	--	--
Naphthalene	1.30E-13	--	--
Fluoranthene	6.30E-13	--	--
Phenanthrene	1.35E-12	--	--
Pyrene	7.60E-13	--	--
DDD	1.08E-11	--	--
DDE	1.50E-11	--	--
DDT	3.63E-11	--	--
Dieldrin	2.11E-13	--	
Total			4E-03 (b)

"–" - Not calculated because contaminant is not considered a carcinogen or potency factor is not available.
"--" - Reference dose is not available.
(a) - The following sites were included in calculating intakes, risks, and hazards for this receptor:
Sites 16, 22, 27, 57 III, 38, 21, 31, 19, 15.
(b)-Final Baseline RA results were a total carcinogenic risk of 2E-08 and a hazard index of 5E-03 (Dames & Moore, 1992a).
* - Replaces original Table 7-13 in the Final Baseline RA; Dames & Moore, 1992a.

TABLE 7-14*

Multiple Pathway Potential Carcinogenic Risks and Noncarcinogenic Hazards for DRMO Worker – Current Land Use Scenario

Pathway No.	Pathway Description	Risk	Hazard Index
1	Dermal Soil Absorption	NA	NA
2	Incidental Ingestion of Soil	2E-08	8E-03
3	Inhalation of Dust	9E-09	4E-03
	Total	3E-08 (a)	1E-02 (a)

"NA" - Pathway not applicable or quantified for this site.

* - Replaces original Table 7-14 in the Final Baseline RA; Dames & Moore, 1992a.

(a)-Final Baseline RA results were a multiple pathway carcinogenic risk and a hazard index of 2E-08 and 1E-02, respectively.

1E-02, respectively, which are equal to or slightly greater than those calculated in the Baseline RA (2E-08 and 1E-02, respectively (Dames & Moore, 1992a)).

7.2.6* Pesticide Worker

As discussed in Section 6.2.1.3*, the pesticide worker may inhale contaminated dust primarily from nine sites located in Operable Units B and H (Sites 16, 21, 31, 38, 57 (Location III), and 60, and followup fieldwork Sites 15, 19, and 22). This risk might occur via detonation operations at Site 16 or via ambient wind conditions at any of the nine sites. Table 7-15* presents the estimated carcinogenic intakes, noncarcinogenic intakes, potency factors, reference doses, potential risks, and potential hazards for inhalation of contaminated soil as airborne dust (pathway 3), the only pathway quantified for this worker.

Under the exposure conditions presented in Table 6-15 in the Baseline RA and including data from the followup fieldwork sites, the total potential carcinogenic risk and noncarcinogenic hazard are 2E-10 and 4E-05, respectively. These results are slightly lower than those calculated in the Baseline RA (5E-10 and 7E-05, respectively (Dames & Moore, 1992a)).

7.2.7* Workers at Buildings 612 and 617

As discussed in Section 6.2.1.3*, the workers at Buildings 612 and 617 may inhale contaminated dust primarily from 11 sites located in Operable Units B, D, I, and J (Sites 9, 16, 38, 41, 45 (Buildings 612 and 617), and 57 (Locations I and II), and followup fieldwork Sites 15, 18, and 19). This risk may occur because of detonation operations at Site 16 or ambient wind conditions at any of the 11 sites. Tables 7-16* and 7-17* present the estimated carcinogenic intakes, noncarcinogenic intakes, potency factors, reference doses, potential risks, and potential hazards for inhalation of contaminated soil as airborne dust (pathway 3) at Buildings 612 and 617, respectively. Pathway 3 is the only pathway quantified for these workers.

Under the exposure conditions presented in Table 6-15 in the Baseline RA and including data from the followup fieldwork sites, the total potential carcinogenic risk

TABLE 7-15*

Potential Carcinogenic Risks and Noncarcinogenic Hazards Due to Inhalation of Dust Current Land Use Scenario, Pesticide Worker (a)

Analyte	Carcinogenic Intake (mg/kg/day)	Slope Factor 1/(mg/kg/day)	Risk
Aluminum	–	–	–
Antimony	–	–	–
Arsenic	8.26E-13	1.4E+01	1E-11
Barium	–	–	–
Beryllium	6.13E-14	8.4E+00	5E-13
Cadmium	1.55E-11	6.3E+00	1E-10
Chromium	1.92E-12	4.2E+01	8E-11
Cobalt	–	–	–
Copper	–	–	–
Cyanide	–	–	–
Iron	–	–	–
Lead	–	–	–
Magnesium	–	–	–
Manganese	–	–	–
Mercury	–	–	–
Nickel	6.82E-13	1.7E+00	1E-12
Potassium	–	–	–
Selenium	–	–	–
Silver	–	–	–
Sodium	–	–	–
Thallium	–	–	–
Zinc	–	–	–
135TNB	–	–	–
246TNT	1.35E-10	–	–
24DNT	2.66E-14	–	–
26DNT	3.56E-15	–	–
HMX	–	–	–
RDX	4.92E-12	–	–
Nitrobenzene	–	–	–
Tetryl	–	–	–
Nitrate/nitrite	–	–	–
Napthalene	–	–	–
Phenanthrene	–	–	–
Dieldrin	1.01E-15	1.6E+01	2E-14
DDD	3.26E-15	–	–
DDE	9.18E-15	–	–
DDT	1.26E-14	3.4E-01	4E-15
Total			2E-10 (b)

Analyte	Noncarcinogenic Intake (mg/kg/day)	Reference Dose (mg/kg/day)	Hazard Quotient
Aluminum	3.70E-10	--	--
Antimony	3.35E-11	--	--
Arsenic	2.31E-12	--	--
Barium	4.66E-09	1.4E-04	3E-05
Beryllium	1.72E-13	--	--
Cadmium	4.34E-11	--	--
Chromium	5.39E-12	6.0E-07	9E-06
Cobalt	1.95E-10	2.9E-04	7E-07
Copper	2.48E-09	--	--
Cyanide	1.17E-11	--	--
Iron	3.38E-09	--	--
Lead	2.06E-10	--	--
Magnesium	1.89E-11	--	--
Manganese	2.01E-12	1.0E-04	2E-08
Mercury	6.89E-14	9.0E-05	8E-10
Nickel	1.91E-12	--	--
Potassium	6.62E-10	--	--
Selenium	3.88E-15	--	--
Silver	2.81E-11	--	--
Sodium	1.04E-09	--	--
Thallium	3.42E-12	--	--
Zinc	2.40E-09	--	--
135TNB	1.72E-12	--	--
246TNT	3.78E-10	--	--
24DNT	7.44E-14	--	--
26DNT	9.97E-15	--	--
HMX	2.58E-14	--	--
RDX	1.38E-11	--	--
Nitrobenzene	9.44E-14	6.0E-04	2E-10
Tetryl	1.14E-13	--	--
Nitrate/nitrite	1.63E-10	--	--
Napthalene	1.74E-15	--	--
Phenanthrene	1.53E-14	--	--
Dieldrin	2.83E-15	--	--
DDD	9.12E-15	--	--
DDE	2.57E-14	--	--
DDT	3.52E-14	--	--
Total			4E-05 (b)

"–" - Not calculated because contaminant is not considered a carcinogen or potency factor is not available.
"--" - Reference dose is not available.
(a) - The following sites were included in calculating intakes, risks, and hazards for this receptor:
Sites 16, 22, 57 III, 21, 38, 31, 19, 60, 15.
(b) - Final Baseline RA results were a total carcinogenic risk of 5E-10 and a hazard index of 7E-05 (Dames & Moore, 1992a).
* - Replaces original Table 7-15 in the Final Baseline RA; Dames & Moore, 1992a.

TABLE 7-16*

Potential Carcinogenic Risks and Noncarcinogenic Hazards Due to Inhalation of Dust Current Land Use Scenario, Worker at Bldg 612 (a)

Analyte	Carcinogenic Intake (mg/kg/day)	Slope Factor 1/(mg/kg/day)	Risk
Aluminum	–	–	–
Antimony	–	–	–
Arsenic	2.63E-10	1.4E+01	4E-09
Barium	–	–	–
Beryllium	7.94E-13	8.4E+00	7E-12
Cadmium	1.13E-09	6.3E+00	7E-09
Chromium	5.91E-10	4.2E+01	2E-08
Cobalt	–	–	–
Copper	–	–	–
Cyanide	–	–	–
Iron	–	–	–
Lead	–	–	–
Magnesium	–	–	–
Manganese	–	–	–
Mercury	–	–	–
Nickel	6.45E-10	1.7E+00	1E-09
Potassium	–	–	–
Selenium	–	–	–
Silver	–	–	–
Sodium	–	–	–
Thallium	–	–	–
Zinc	–	–	–
1,1,1-Trichloroethane	–	–	–
Di-n-butyl phthalate	–	–	–
Phenanthrene	–	–	–
DDE	–	–	–
DDT	1.10E-14	3.4E-01	4E-15
135TNB	–	–	–
246TNT	–	–	–
HMX	–	–	–
RDX	–	–	–
24DNT	–	–	–
26DNT	–	–	–
Nitrobenzene	–	–	–
Tetryl	–	–	–
Nitrate/nitrite	–	–	–
Total			4E-08 (b)

Analyte	Noncarcinogenic Intake (mg/kg/day)	Reference Dose (mg/kg/day)	Hazard Quotient
Aluminum	2.08E-07	--	--
Antimony	9.64E-09	--	--
Arsenic	7.38E-10	--	--
Barium	1.96E-07	1.4E-04	1E-03
Beryllium	2.22E-12	--	--
Cadmium	3.17E-09	--	--
Chromium	1.65E-09	6.0E-07	3E-03
Cobalt	4.99E-09	2.9E-04	2E-05
Copper	3.64E-07	--	--
Cyanide	2.97E-10	--	--
Iron	8.49E-08	--	--
Lead	1.50E-08	--	--
Magnesium	4.01E-09	--	--
Manganese	5.02E-09	1.0E-04	5E-05
Mercury	1.41E-11	9.0E-05	2E-07
Nickel	1.81E-09	--	--
Potassium	3.95E-08	--	--
Selenium	8.22E-13	--	--
Silver	4.08E-10	--	--
Sodium	1.55E-08	--	--
Thallium	1.05E-10	--	--
Zinc	6.31E-07	--	--
1,1,1-Trichloroethane	3.07E-14	3.0E-01	1E-13
Di-n-butyl phthalate	6.45E-13	--	--
Phenanthrene	2.06E-13	--	--
DDE	2.63E-14	--	--
DDT	3.07E-14	--	--
135TNB	4.05E-10	--	--
246TNT	1.02E-07	--	--
HMX	2.03E-11	--	--
RDX	3.75E-10	--	--
24DNT	7.38E-13	--	--
26DNT	5.51E-14	--	--
Nitrobenzene	3.28E-11	6.0E-04	5E-08
Tetryl	1.67E-11	--	--
Nitrate/nitrite	4.22E-09	--	--
Total			4E-03 (b)

"–" - Not calculated because contaminant is not considered a carcinogen or potency factor is not available.
"--" - Reference dose is not available.
(a) - The following sites were included in calculating intakes, risks, and hazards for this receptor: Sites 16, 45 bldg 612, 9, 19, 18, 57 I, 38, 57 II, 15.
(b) - Final Baseline RA results were a total carcinogenic risk of 1E-07 and a hazard index of 1E-02 (Dames & Moore, 1992a).
* - Replaces original Table 7-16 in the Final Baseline RA; Dames & Moore, 1992a.

TABLE 7-17*

Potential Carcinogenic Risks and Noncarcinogenic Hazards Due to Inhalation of Dust
Current Land Use Scenario, Worker at Bldg 617 (a)

Analyte	Carcinogenic Intake (mg/kg/day)	Slope Factor 1/(mg/kg/day)	Risk
Aluminum	-	-	-
Antimony	-	-	-
Arsenic	3.43E-10	1.4E+01	5E-09
Barium	-	-	-
Beryllium	4.76E-13	8.4E+00	4E-12
Cadmium	1.45E-09	6.3E+00	9E-09
Chromium	3.64E-10	4.2E+01	2E-08
Cobalt	-	-	-
Copper	-	-	-
Cyanide	-	-	-
Iron	-	-	-
Lead	-	-	-
Magnesium	-	-	-
Manganese	-	-	-
Mercury	-	-	-
Nickel	4.83E-10	1.7E+00	8E-10
Potassium	-	-	-
Selenium	-	-	-
Silver	-	-	-
Sodium	-	-	-
Thallium	-	-	-
Zinc	-	-	-
1,1,1-Trichloroethane	-	-	-
135TNB	-	-	-
246TNT	4.83E-08	-	-
HMX	-	-	-
RDX	2.00E-10	-	-
24DNT	1.58E-13	-	-
26DNT	1.18E-14	-	-
Nitrobenzene	-	-	-
Tetryl	-	-	-
Nitrate/nitrite	-	-	-
Di-n-butyl phthalate	-	-	-
Phenanthrene	-	-	-
DDE	5.77E-15	-	-
DDT	6.74E-15	3.4E-01	2E-15
Total			3E-08 (b)

Analyte	Noncarcinogenic Intake (mg/kg/day)	Reference Dose (mg/kg/day)	Hazard Quotient
Aluminum	2.19E-07	--	--
Antimony	1.23E-08	--	--
Arsenic	9.60E-10	--	--
Barium	2.87E-07	1.4E-04	2E-03
Beryllium	1.33E-12	--	--
Cadmium	4.07E-09	--	--
Chromium	1.02E-09	6.0E-07	2E-03
Cobalt	7.89E-09	2.9E-04	3E-05
Copper	4.78E-07	--	--
Cyanide	4.72E-10	--	--
Iron	6.60E-07	--	--
Lead	1.74E-08	--	--
Magnesium	2.40E-09	--	--
Manganese	3.08E-09	1.0E-04	3E-05
Mercury	1.22E-11	9.0E-05	1E-07
Nickel	1.35E-09	--	--
Potassium	3.94E-08	--	--
Selenium	4.92E-13	--	--
Silver	6.39E-10	--	--
Sodium	1.47E-08	--	--
Thallium	6.31E-11	--	--
Zinc	8.19E-07	--	--
1,1,1-Trichloroethane	1.89E-14	3.0E-01	6E-14
135TNB	5.36E-10	--	--
246TNT	1.35E-07	--	--
HMX	3.27E-12	--	--
RDX	5.60E-10	--	--
24DNT	4.42E-13	--	--
26DNT	3.30E-14	--	--
Nitrobenzene	4.35E-11	6.0E-04	7E-08
Tetryl	1.99E-11	--	--
Nitrate/nitrite	6.63E-09	--	--
Di-n-butyl phthalate	7.51E-13	--	--
Phenanthrene	1.27E-13	--	--
DDE	1.62E-14	--	--
DDT	1.89E-14	--	--
Total			4E-03 (b)

"-" - Not calculated because contaminant is not considered a carcinogen or potency factor is not available.
"--" - Reference dose is not available.
(a) - The following sites were included in calculating intakes, risks, and hazards for this receptor:
Sites 16, 45 bldg 617, 19, 18, 41, 57 I, 15.
(b) - Final Baseline RA results were a total carcinogenic risk of 9E-08 and a hazard index of 9E-03 (Dames & Moore, 1992a).
* - Replaces original Table 7-17 in the Final Baseline RA; Dames & Moore, 1992a.

and noncarcinogenic hazard at Building 612 are 4E-08 and 4E-03, respectively. These values are lower than those calculated in the Baseline RA (1E-07 and 1E-02, respectively (Dames & Moore, 1992a)). The total potential carcinogenic risk and noncarcinogenic hazard at Building 617 are 3E-08 and 4E-03, respectively, which are slightly lower than those calculated in the Baseline RA (9E-08 and 9E-03, respectively (Dames & Moore, 1992a)). As presented in Table 7-18*, the multiple pathway potential carcinogenic risk and noncarcinogenic hazard estimates for these workers under the assumed exposure conditions are 7E-08 and 8E-03, respectively. These values are less than those calculated in the Baseline RA (2E-07 and 2E-02, respectively (Dames & Moore, 1992a)).

7.2.8* Eastern Boundary Residents

As discussed in Section 6.2.1.3*, residents living close to the eastern boundary of the installation are located in the predominant downwind direction of UMDA sites and may inhale contaminated dust primarily from 22 sites located in Operable Units A, B, D, E, I, and J (Sites 4, 9, 10, 16, 21, 25 (Location I), 31, 38, 39, 52, 57 (Locations I, II, and III), 60, 67, and 81 (Location I), and followup fieldwork Sites 5, 15, 18, 19, 26, and 47). This risk may occur because of detonation operations at Site 16 or ambient wind conditions at any of the 22 sites. Table 7-19* presents the estimated carcinogenic intakes, noncarcinogenic intakes, potency factors, reference doses, potential risks, and potential hazards for inhalation of contaminated soil as airborne dust (pathway 3), the only pathway applicable for these current offsite residents.

Under the exposure conditions presented in Table 6-15 in the Baseline RA and including data from the followup fieldwork sites, the total potential carcinogenic risk and noncarcinogenic hazard are 3E-08 and 3E-03, respectively, which are slightly lower than those calculated in the Baseline RA (8E-08 and 8E-03, respectively (Dames & Moore, 1992a)).

TABLE 7-18*

Multiple Pathway Potential Carcinogenic Risks and Noncarcinogenic Hazards for Boiler Workers at Buildings 612 & 617 -- Current Land Use Scenario

Pathway No.	Pathway Description	Risk	Hazard Index
1	Dermal Soil Absorption	NA	NA
2	Incidental Ingestion of Soil	NA	NA
3	Inhalation of Dust:		
	Building 612	4E-08	4E-03
	Building 617	3E-08	4E-03
	Total	7E-08 (a)	8E-03 (a)

NA = Pathway not applicable or quantified for this receptor.

* - Replaces original Table 7-18 in the Final Baseline RA; Dames & Moore, 1992a.

(a) - Final Baseline RA results were a multiple pathway total carcinogenic risk and hazard index of 2E-07 and 2E-02, respectively (Dames & Moore, 1992a).

TABLE 7-19*

Potential Carcinogenic Risks and Noncarcinogenic Hazards Due to Inhalation of Dust Current Land Use Scenario, Eastern Boundary Residents (a)

Analyte	Carcinogenic Intake (mg/kg/day)	Slope Factor 1/(mg/kg/day)	Risk
Aluminum	--	--	--
Antimony	--	--	--
Arsenic	1.77E-10	1.4E+01	2E-09
Barium	--	--	--
Beryllium	7.43E-13	8.4E+00	6E-12
Cadmium	1.11E-09	6.3E+00	7E-09
Calcium	--	--	--
Chromium	4.60E-10	4.2E+01	2E-08
Cobalt	--	--	--
Copper	--	--	--
Cyanide	--	--	--
Iron	--	--	--
Lead	--	--	--
Magnesium	--	--	--
Manganese	--	--	--
Mercury	--	--	--
Nickel	3.60E-10	1.7E+00	6E-10
Potassium	--	--	--
Selenium	--	--	--
Silver	--	--	--
Sodium	--	--	--
Thallium	--	--	--
Zinc	--	--	--
1,1,1-Trichloroethane	--	--	--
135TNB	--	--	--
13DNB	--	--	--
246TNT	2.89E-08	--	--
24DNT	9.13E-12	--	--
26DNT	9.51E-13	--	--
HMX	--	--	--
RDX	4.23E-10	--	--
Nitrobenzene	--	--	--
Tetryl	--	--	--
Nitrate/nitrite	--	--	--
Benzo(a)anthracene	7.54E-14	6.1E+00	5E-13
Benzo(b)fluoranthene	1.36E-13	6.1E+00	8E-13
Benzo(k)fluoranthene	6.97E-14	6.1E+00	4E-13
Chrysene	1.46E-13	6.1E+00	9E-13
Di-n-butyl phthalate	--	--	--
Fluoranthene	--	--	--
Napthalene	--	--	--
Phenanthrene	--	--	--
Pyrene	--	--	--
Chlordane	9.18E-14	1.3E+00	1E-13
Dieldrin	2.74E-13	1.6E+01	4E-12
DDD	3.25E-13	--	--
DDE	1.70E-12	--	--
DDT	1.41E-12	3.4E-01	5E-13
PCB 1260	1.02E-13	--	--
Total			3E-08 (b)

TABLE 7-19* (cont'd)

Potential Carcinogenic Risks and Noncarcinogenic Hazards Due to Inhalation of Dust Current Land Use Scenario, Eastern Boundary Residents (a)

Analyte	Noncarcinogenic Intake (mg/kg/day)	Reference Dose (mg/kg/day)	Hazard Quotient
Aluminum	9.90E-08	**	**
Antimony	4.86E-09	**	**
Arsenic	4.12E-10	**	**
Barium	2.06E-07	1.4E-04	1E-03
Beryllium	1.73E-12	**	**
Cadmium	2.60E-09	**	**
Calcium	5.18E-08	**	**
Chromium	1.07E-09	6.0E-07	2E-03
Cobalt	7.24E-09	2.9E-04	3E-05
Copper	2.45E-07	**	**
Cyanide	4.33E-10	**	**
Iron	7.15E-07	**	**
Lead	1.21E-08	**	**
Magnesium	1.44E-08	**	**
Manganese	2.51E-09	1.0E-04	3E-05
Mercury	1.81E-11	9.0E-05	2E-07
Nickel	8.41E-10	**	**
Potassium	9.60E-08	**	**
Selenium	8.25E-13	**	**
Silver	3.64E-09	**	**
Sodium	2.35E-07	**	**
Thallium	1.06E-10	**	**
Zinc	4.23E-07	**	**
1,1,1-Trichloroethane	1.45E-14	3.0E-01	5E-14
135TNB	3.38E-10	**	**
13DNB	1.94E-13	**	**
246TNT	6.75E-08	**	**
24DNT	2.13E-11	**	**
26DNT	2.22E-12	**	**
HMX	5.67E-11	**	**
RDX	9.87E-10	**	**
Nitrobenzene	1.57E-11	6.0E-04	3E-08
Tetryl	2.91E-11	**	**
Nitrate/nitrite	6.56E-09	**	**
Benzo(a)anthracene	1.76E-13	**	**
Benzo(b)fluoranthene	3.17E-13	**	**
Benzo(k)fluoranthene	1.63E-13	**	**
Chrysene	3.40E-13	**	**
Di-n-butyl phthalate	8.80E-13	**	**
Fluoranthene	2.08E-13	**	**
Napthalene	3.89E-13	**	**
Phenanthrene	3.60E-12	**	**
Pyrene	2.30E-13	**	**
Chlordane	2.14E-13	**	**
Dieldrin	6.39E-13	**	**
DDD	7.58E-13	**	**
DDE	3.97E-12	**	**
DDT	3.29E-12	**	**
PCB 1260	2.38E-13	**	**
Total			3E-03 (b)

"--" - Not calculated because contaminant is not considered a carcinogen or potency factor is not available.
"**" - Reference dose is not available.
(a) The following sites were included in calculating intakes, risks, and hazards for this receptor:
Sites 16, 57 III, 21, 38, 52, 31, 60, 19, 9, 10, 39, 18, 26, 57 II, 81 I, 57 I, 67, 4, 47, 25 I, 5, 15.
(b) - Final Baseline RA results were a total potential carcinogenic risk of 8E-08 and a hazard index of 8E-03 (Dames & Moore, 1992a).
* - Replaces original Table 7-19 in the Final Baseline RA; Dames & Moore, 1992a.

7.2.9* Hermiston Residents

As discussed in Section 6.2.1.3*, residents living in Hermiston--a highly populated town located in the predominant downwind direction of UMDA sites--may inhale contaminated dust primarily from 22 sites located in Operable Units A, B, D, E, H, I, and J (Sites 9, 10, 16, 21, 25 (Locations I and II), 31, 38, 39, 41, 52, 53, 57 (Locations I, II, and III), 60, and 81 (Location I), and followup fieldwork Sites 15, 18, 19, 22, and 26). This dust could be generated by detonation operations at Site 16 or by ambient wind conditions at any of the 22 sites. Table 7-20* presents the estimated carcinogenic intakes, noncarcinogenic intakes, potency factors, reference doses, potential risks, and potential hazards for inhalation of contaminated soil as airborne dust (pathway 3), the only pathway applicable for these current offsite residents.

Under the exposure conditions presented in Table 6-15 in the Baseline RA, the total potential carcinogenic risk and noncarcinogenic hazard are 2E-08 and 2E-03, respectively. These results are slightly lower than those calculated in the Baseline RA (6E-08 and 5E-03, respectively (Dames & Moore, 1992a)).

7.2.10* Western Boundary Residents

As discussed in Section 6.2.1.3*, though residents living close to the western boundary of the installation are not in the predominant downwind direction of UMDA sites, they may still inhale contaminated airborne soil as dust from operations in the ADA Area near the western boundary (e.g., detonation operations at Site 16). Contaminated dust is expected to originate primarily from three sites located in Operable Unit B (Site 16 and followup fieldwork Sites 15 and 19). Contaminated dust may be generated by the detonation operations at Site 16 or by ambient wind conditions at any of the three sites. Table 7-21* presents the estimated carcinogenic intakes, noncarcinogenic intakes, potency factors, reference doses, potential risks, and potential hazards for inhalation of contaminated soil as airborne dust (pathway 3), the only pathway applicable for these current offsite residents.

TABLE 7-20*

Potential Carcinogenic Risks and Noncarcinogenic Hazards Due to Inhalation of Dust Current Land Use Scenario, Hermiston Residents (a)

Analyte	Carcinogenic Intake (mg/kg/day)	Slope Factor 1/(mg/kg/day)	Risk
Aluminum	–	–	–
Antimony	–	–	–
Arsenic	1.26E-10	1.4E+01	2E-09
Barium	–	–	–
Beryllium	7.93E-13	8.4E+00	7E-12
Cadmium	6.67E-10	6.3E+00	4E-09
Chromium	3.23E-10	4.2E+01	1E-08
Cobalt	–	–	–
Copper	–	–	–
Cyanide	–	–	–
Iron	–	–	–
Lead	–	–	–
Magnesium	–	–	–
Manganese	–	–	–
Mercury	–	–	–
Nickel	2.57E-10	1.7E+00	4E-10
Potassium	–	–	–
Selenium	–	–	–
Silver	–	–	–
Sodium	–	–	–
Thallium	–	–	–
Zinc	–	–	–
1,1,1-Trichloroethane	–	–	–
135TNB	–	–	–
246TNT	1.97E-08	–	–
24DNT	3.93E-12	–	–
26DNT	5.27E-13	–	–
HMX	–	–	–
RDX	1.13E-10	–	–
Nitrobenzene	–	–	–
Tetryl	–	–	–
Nitrate/nitrite	–	–	–
Anthracene	–	–	–
Di-n-butyl phthalate	–	–	–
Napthalene	–	–	–
Phenanthrene	–	–	–
Pyrene	–	–	–
Dieldrin	1.50E-13	1.6E+01	2E-12
DDD	1.60E-13	–	–
DDE	9.51E-13	–	–
DDT	8.01E-13	3.4E-01	3E-13
Total			**2E-08 (b)**

TABLE 7-20* (cont'd)

Potential Carcinogenic Risks and Noncarcinogenic Hazards Due to Inhalation of Dust Current Land Use Scenario, Hermiston Residents (a)

Analyte	Noncarcinogenic Intake (mg/kg/day)	Reference Dose (mg/kg/day)	Hazard Quotient
Aluminum	7.45E-08	**	**
Antimony	3.61E-09	**	**
Arsenic	2.95E-10	**	**
Barium	1.08E-07	1.4E-04	8E-04
Beryllium	1.85E-12	**	**
Cadmium	1.56E-09	**	**
Chromium	7.54E-10	6.0E-07	1E-03
Cobalt	3.41E-09	2.9E-04	1E-05
Copper	1.69E-07	**	**
Cyanide	2.03E-10	**	**
Iron	4.24E-07	**	**
Lead	1.08E-08	**	**
Magnesium	2.23E-09	**	**
Manganese	1.87E-09	1.0E-04	2E-05
Mercury	1.22E-11	9.0E-05	1E-07
Nickel	5.99E-10	**	**
Potassium	5.85E-08	**	**
Selenium	4.58E-13	**	**
Silver	1.76E-09	**	**
Sodium	1.31E-07	**	**
Thallium	8.82E-11	**	**
Zinc	2.90E-07	**	**
1,1,1-Trichloroethane	1.09E-14	3.0E-01	4E-14
135TNB	2.14E-10	**	**
246TNT	4.61E-08	**	**
24DNT	9.16E-12	**	**
26DNT	1.23E-12	**	**
HMX	6.81E-12	**	**
RDX	2.64E-10	**	**
Nitrobenzene	1.18E-11	6.0E-04	2E-08
Tetryl	1.68E-11	**	**
Nitrate/nitrite	3.11E-09	**	**
Anthracene	3.72E-13	**	**
Di-n-butyl phthalate	2.86E-13	**	**
Napthalene	2.14E-13	**	**
Phenanthrene	4.47E-12	**	**
Pyrene	9.57E-13	**	**
Dieldrin	3.49E-13	**	**
DDD	3.73E-13	**	**
DDE	2.22E-12	**	**
DDT	1.87E-12	**	**
Total			2E-03 (b)

~~"-" - Not calculate~~d because contaminant is not considered a carcinogen or potency factor is not available.
"**" - Reference dose is not available.
(a) - The following sites were included in calculating intakes, risks, and hazards for this receptor:
Sites 16, 39, 57 III, 38, 21, 31, 19, 60, 9, 52, 18, 10, 57 II, 57 I, 26, 81 I, 22, 25 II, 53, 41, 25 I, 15.
(b) - Final Baseline RA results were a total carcinogenic risk of 6E-08 and a hazard index of 5E-03.
* - Replaces original Table 7-20 in the Final Baseline RA; Dames & Moore, 1992a.

TABLE 7-21*

Potential Carcinogenic Risks and Noncarcinogenic Hazards Due to Inhalation of Dust Current Land Use Scenario, Western Boundary Residents (a)

Analyte	Carcinogenic Intake (mg/kg/day)	Slope Factor 1/(mg/kg/day)	Risk
Aluminum	–	–	–
Antimony	–	–	–
Arsenic	4.03E-11	1.4E+01	6E-10
Barium	–	–	–
Beryllium	6.14E-13	8.4E+00	5E-12
Cadmium	4.03E-09	6.3E+00	3E-08
Chromium	2.89E-10	4.2E+01	1E-08
Cobalt	–	–	–
Copper	–	–	–
Cyanide	–	–	–
Iron	–	–	–
Lead	–	–	–
Magnesium	–	–	–
Manganese	–	–	–
Mercury	–	–	–
Nickel	2.69E-11	1.7E+00	5E-11
Potassium	–	–	–
Selenium	–	–	–
Silver	–	–	–
Sodium	–	–	–
Thallium	–	–	–
Zinc	–	–	–
135TNB	–	–	–
246TNT	6.82E-09	–	–
HMX	–	–	–
RDX	1.53E-09	–	–
24DNT	2.04E-13	–	–
26DNT	1.52E-14	–	–
Nitrobenzene	–	–	–
Tetryl	–	–	–
Nitrate/nitrite	–	–	–
Total			4E-08 (b)

Analyte	Noncarcinogenic Intake (mg/kg/day)	Reference Dose (mg/kg/day)	Hazard Quotient
Aluminum	3.28E-08	**	**
Antimony	2.91E-09	**	**
Arsenic	1.88E-10	**	**
Barium	2.32E-06	1.4E-04	2E-02
Beryllium	2.86E-12	**	**
Cadmium	1.88E-08	**	**
Chromium	1.35E-09	6.0E-07	2E-03
Cobalt	1.02E-07	2.9E-04	4E-04
Copper	7.18E-07	**	**
Cyanide	6.13E-09	**	**
Iron	3.43E-08	**	**
Lead	3.44E-09	**	**
Magnesium	5.16E-09	**	**
Manganese	5.49E-10	1.0E-04	5E-06
Mercury	2.36E-12	9.0E-05	3E-08
Nickel	1.26E-10	**	**
Potassium	8.16E-09	**	**
Selenium	1.06E-12	**	**
Silver	8.02E-09	**	**
Sodium	2.42E-09	**	**
Thallium	1.36E-10	**	
Zinc	1.62E-07	**	**
135TNB	1.05E-10	**	**
246TNT	3.18E-08	**	**
HMX	7.03E-12	**	**
RDX	7.13E-09	**	**
24DNT	9.50E-13	**	**
26DNT	7.10E-14	**	**
Nitrobenzene	8.39E-12	6.0E-04	1E-08
Tetryl	3.84E-12	**	**
Nitrate/nitrite	8.40E-08	**	**
Total			2E-02 (b)

"–" - Not calculated because contaminant is not considered a carcinogen or potency factor is not available.
"**" - Reference dose is not available.
(a) The following sites were included in calculating intakes, risks, and hazards for this receptor: Sites 16, 19, 15.
(b) - Final Baseline RA results were a total potential carcinogenic risk of 7E-08 and 3E-02 (Dames & Moore, 1992a).
* - Replaces original Table 7-21 in the Final Baeline RA; Dames & Moore, 1992a.

Under the exposure conditions presented in Table 6-15 in the Baseline RA, the total potential carcinogenic risk and noncarcinogenic hazard are 4E-08 and 2E-02, respectively.

7.2.11* Irrigon Residents

As discussed in Section 6.2.1.3*, residents living in Irrigon--a highly populated town located west of UMDA--may inhale contaminated dust primarily from three Operable Unit B sites (Site 16 and followup fieldwork Sites 15 and 19). Dust may be generated by detonation operations at Site 16 or by ambient wind conditions at any of the three sites. Table 7-22* presents the estimated carcinogenic intakes, noncarcinogenic intakes, potency factors, reference doses, potential risks, and potential hazards for inhalation of contaminated soil as airborne dust (pathway 3), the only pathway applicable for these current offsite residents.

Under the exposure conditions presented in Table 6-15 in the Baseline RA, the total potential carcinogenic risk and noncarcinogenic hazard are 5E-09 and 2E-03, respectively. These results are slightly lower than those calculated in the Baseline RA (1E-08 and 3E-03, respectively (Dames & Moore, 1992a)).

7.3* FUTURE LAND USE SCENARIO

7.3.1* Operable Unit A: Explosive Washout Lagoons and Associated Buildings

7.3.1.2* Site 5: Explosive Washout Plant. Tables 7-35* through 7-38* present the estimated carcinogenic intakes, noncarcinogenic intakes, potency factors, reference doses, potential risks, and potential hazards, as applicable, for dermal absorption of contaminants in soil, incidental soil ingestion, dust inhalation, and crop ingestion (pathways 1, 2, 3, and 12), respectively, for the future residential land use scenario at followup fieldwork Site 5.

The total potential carcinogenic risk and noncarcinogenic hazard for dermal absorption of contaminants in soil (pathway 1), calculated using data from the Baseline RA as well as data from the followup fieldwork, are 4E-04 and 7E+01, respectively. These results are slightly lower than those calculated in the Baseline RA

TABLE 7-22 *

Potential Carcinogenic Risks and Noncarcinogenic Hazards Due to Inhalation of Dust
Current Land Use Scenario, Irrigon Residents (a)

Analyte	Carcinogenic Intake (mg/kg/day)	Slope Factor 1/(mg/kg/day)	Risk
Aluminum	--	--	--
Antimony	--	--	--
Arsenic	2.05E-11	1.4E+01	3E-10
Barium	--	--	--
Beryllium	9.22E-14	8.4E+00	8E-13
Cadmium	4.14E-10	6.3E+00	3E-09
Chromium	4.80E-11	4.2E+01	2E-09
Cobalt	--	--	--
Copper	--	--	--
Cyanide	--	--	--
Iron	--	--	--
Lead	--	--	--
Magnesium	--	--	--
Manganese	--	--	--
Mercury	--	--	--
Nickel	8.88E-12	1.7E+00	2E-11
Potassium	--	--	--
Selenium	--	--	--
Silver	--	--	--
Sodium	--	--	--
Thallium	--	--	--
Zinc	--	--	--
135TNB	--	--	--
246TNT	3.01E-09	--	--
HMX	--	--	--
RDX	1.38E-10	--	--
24DNT	3.06E-14	--	--
26DNT	2.28E-15	--	--
Nitrobenzene	--	--	--
Tetryl	--	--	--
Nitrate/nitrite	--	--	--
Total			5E-09 (b)

Analyte	Noncarcinogenic Intake (mg/kg/day)	Reference Dose (mg/kg/day)	Hazard Quotient
Aluminum	1.71E-08	----	----
Antimony	1.29E-09	----	----
Arsenic	9.56E-11	----	----
Barium	2.18E-07	1.4E-04	2E-03
Beryllium	4.30E-13	----	----
Cadmium	1.93E-09	----	----
Chromium	2.24E-10	6.0E-07	4E-04
Cobalt	9.23E-09	2.9E-04	3E-05
Copper	1.00E-07	----	----
Cyanide	5.53E-10	----	----
Iron	5.15E-09	----	----
Lead	1.69E-09	----	----
Magnesium	7.75E-10	----	----
Manganese	8.24E-11	1.0E-04	8E-07
Mercury	1.21E-12	9.0E-05	1E-08
Nickel	4.14E-11	----	----
Potassium	3.77E-09	----	----
Selenium	1.59E-13	----	----
Silver	7.25E-10	----	----
Sodium	1.06E-09	----	----
Thallium	2.04E-11	----	
Zinc	8.22E-08	----	----
135TNB	5.40E-11	----	----
246TNT	1.40E-08	----	----
HMX	1.06E-12	----	----
RDX	6.45E-10	----	----
24DNT	1.43E-13	----	----
26DNT	1.07E-14	----	----
Nitrobenzene	4.36E-12	6.0E-04	7E-09
Tetryl	2.00E-12	----	----
Nitrate/nitrite	7.60E-09	----	----
Total			2E-03 (b)

"--" - Not calculated because contaminant is not considered a carcinogen or potency factor is not available.
"----" - Reference dose is not available.
(a) The following sites were included in calculating intakes, risks, and hazards for this receptor:
Sites 16, 19, 15.
(b) - Final Baseline RA results were a total potential carcinogenic risk of 1E-08 and a hazard index of 3E-03 (Dames & Moore, 1992a).
* - Replaces original Table 7-22 in the Final Baseline RA; Dames & Moore, 1992a.

TABLE 7-35*

Potential Carcinogenic Risks and Noncarcinogenic Hazards Due to Dermal Absorption of Contaminants in Soil at Site 5 Future Residential Land Use Scenario

Analyte	Carcinogenic Intake (mg/kg/day)	Slope Factor 1/(mg/kg/day)	Risk
135TNB	–	–	–
13DNB	–	–	–
246TNT	1.42E-02	3.0E-02	4E-04
24DNT	1.55E-05	6.8E-01	1E-05
HMX	–	–	–
RDX	0.00E+00 (a)	1.1E-01	0E+00
Tetryl	–	–	–
Total			4E-04 (b)

Analyte	Noncarcinogenic Intake (mg/kg/day)	Reference Dose (mg/kg/day)	Hazard Quotient
135TNB	2.49E-04	5.0E-05	5E+00
13DNB	1.32E-05	1.0E-04	1E-01
246TNT	3.32E-02	5.0E-04	7E+01
24DNT	3.61E-05	2.0E-03	2E-02
HMX	7.72E-04	5.0E-02	2E-02
RDX	0.00E+00 (a)	3.0E-03	0E+00
Tetryl	1.49E-04	1.0E-02	1E-02
Total			7E+01 (b)

(a) - Because RDX is not dermally absorbed, the carcinogenic and noncarcinogenic intakes are zero.

(b) - Final Baseline RA results were a total potential carcinogenic risk of 1E-03 and a hazard index of 2E+02 (Dames & Moore, 1992a).

"–" - Not calculated because contaminant is not considered a carcinogen or potency factor is not available.

* - Replaces original Table 7-35 in the Final Baseline RA; Dames & Moore, 1992a.

TABLE 7-36*

Potential Carcinogenic Risks and Noncarcinogenic Hazards Due to Incidental Ingestion of Soil at Site 5 Future Residential Land Use Scenario

Analyte	Carcinogenic Intake (mg/kg/day)	Slope Factor 1/(mg/kg/day)	Risk
135TNB	--	--	--
13DNB	--	--	--
246TNT	1.19E-03	3.0E-02	4E-05
24DNT	1.29E-06	6.8E-01	9E-07
HMX	--	--	--
RDX	2.58E-04	1.1E-01	3E-05
Tetryl	--	--	--
Nitrite/nitrate	--	--	--
Total			6E-05 (a)

Analyte	Noncarcinogenic Intake (mg/kg/day)	Reference Dose (mg/kg/day)	Hazard Quotient
135TNB	2.07E-05	5.0E-05	4E-01
13DNB	1.10E-06	1.0E-04	1E-02
246TNT	2.77E-03	5.0E-04	6E+00
24DNT	3.01E-06	2.0E-03	2E-03
HMX	6.43E-05	5.0E-02	1E-03
RDX	6.03E-04	3.0E-03	2E-01
Tetryl	1.24E-05	1.0E-02	1E-03
Nitrite/nitrate	3.03E-05	1.6E+00	2E-05
Total			6E+00 (a)

"--" - Not calculated because contaminant is not considered a carcinogen or potency factor is not available.

* - Replaces original Table 7-36 in the Final Baseline RA; Dames & Moore, 1992a.

(a) - Final Baseline RA results were a total potential carcinogenic risk of 1E-04 and a hazard index of 1E+01 (Dames & Moore, 1992a).

TABLE 7-37*

Potential Carcinogenic Risks and Noncarcinogenic Hazards
Due to Inhalation of Dust at Site 5
Future Residential Land Use Scenario

Analyte	Carcinogenic Intake (mg/kg/day)	Slope Factor 1/(mg/kg/day)	Risk
135TNB	–	–	–
13DNB	–	–	–
246TNT	7.43E-08	–	–
24DNT	8.08E-11	–	–
HMX	–	–	–
RDX	1.62E-08	–	–
Tetryl	–	–	–
Nitrite/nitrate	–	–	–
Total			0E+00 (a)

Analyte	Noncarcinogenic Intake (mg/kg/day)	Reference Dose (mg/kg/day)	Hazard Quotient
135TNB	1.30E-09	**	**
13DNB	6.91E-11	**	**
246TNT	1.73E-07	**	**
24DNT	1.89E-10	**	**
HMX	4.03E-09	**	**
RDX	3.77E-08	**	**
Tetryl	7.76E-10	**	**
Nitrite/nitrate	1.90E-09	**	**
Total			0E+00 (a)

"–" - Not calculated because contaminant is not considered a carcinogen or potency factor is not available.

"**" - Reference dose is not available.

* - Replaces original Table 7-37 in the Final Baseline RA; Dames & Moore, 1992a

(a) - These results are unchanged from those calculated in the Baseline RA (Dames & Moore, 1992a).

TABLE 7-38*

Potential Carcinogenic Risks and Noncarcinogenic Hazards Due to the Consumption of Crops at Site 5 Future Residential Land Use Scenario

Analyte	Carcinogenic Intake (mg/kg/day)	Slope Factor 1/(mg/kg/day)	Risk (a)
135TNB	–	–	–
13DNB	–	–	–
246TNT	9.63E-01	3.0E-02	3E-02
24DNT	1.07E-03	6.8E-01	7E-04
HMX	–	–	–
RDX	9.43E-01	1.1E-01	1E-01
Tetryl	–	–	–
Nitrate/nitrite	–	–	–
Total			1E-01 (b)

Analyte	Noncarcinogenic Intake (mg/kg/day)	Reference Dose (mg/kg/day)	Hazard Quotient
135TNB	5.00E-02	5.0E-05	1E+03
13DNB	1.76E-03	1.0E-04	2E+01
246TNT	2.25E+00	5.0E-04	4E+03
24DNT	2.51E-03	2.0E-03	1E+00
HMX	5.28E-01	5.0E-02	1E+01
RDX	2.20E+00	3.0E-03	7E+02
Tetryl	1.60E-02	1.0E-02	2E+00
Nitrate/nitrite	xx	1.6E+00	xx
Total			6E+03 (b)

(a) - Since chemical intakes for this pathway are expected to be high, the one-hit equation is used to estimate carcinogenic risks instead of the linear low-dose cancer risk equation.

(b) - Final Baseline RA results were a total potential carcinogenic risk of 3E-01 and a hazard index of 1E+04 (Dames & Moore, 1992a).

"–" - Not calculated because contaminant is not considered a carcinogen or potency factor is not available.

"xx" - Quantitative information on uptake factors not available.

"***" - Reference dose is not available.

* - Replaces original Table 7-38 in the Final Baseline RA; Dames & Moore, 1992a.

(1E-03 and 2E+02, respectively (Dames & Moore, 1992a)). As in the Baseline RA, the potential carcinogenic risk of 4E-04 is due mainly to the presence of 2,4,6-TNT in Site 5 soil. As in the Baseline RA, the potential noncarcinogenic hazard of 7E+01 is due to the presence of 2,4,6-TNT and 1,3,5-TNB in site soil.

The total potential carcinogenic risk and noncarcinogenic hazard for inadvertent ingestion of contaminated soil (pathway 2) are 6E-05 and 6, respectively. These results are slightly lower than those calculated in the Baseline RA (1E-04 and 1E+01, respectively (Dames & Moore, 1992a)). As in the Baseline RA, the potential carcinogenic risk of 6E-05 is due to the presence of 2,4,6-TNT and RDX in Site 5 soil. As in the Baseline RA, the potential noncarcinogenic hazard of 6 is due mainly to the presence of 2,4,6-TNT in site soil. Because the hazard quotient for 2,4,6-TNT is the primary contributor to the hazard index of 6, the segregation of chemicals by adverse health effects is not further investigated.

Because inhalation potency factors and reference doses are not available, no potential carcinogenic risks or noncarcinogenic hazards are calculated for inhalation of contaminated soil as airborne dust (pathway 3).

The total potential carcinogenic risk and noncarcinogenic hazard for consumption of crops irrigated by contaminated groundwater or grown in contaminated soil (pathway 12) are 1E-01 and 6E+03, respectively. These results are slightly lower than those calculated in the Baseline RA (3E-01 and 1E+04, respectively (Dames & Moore, 1992a)). Because potential carcinogenic risks for this pathway are high (i.e., greater than 1E-02) using the linear low-dose cancer risk equation, the one-hit equation (see Section 7.1 of the Baseline RA) is used to estimate carcinogenic risks. As in the Baseline RA, the potential carcinogenic risk of 1E-01 is due mainly to the presence of 2,4,6-TNT and RDX in soil. As in the Baseline RA, the potential noncarcinogenic hazard of 6E+03 is due to the presence of 1,3,5-TNB, 2,4,6-TNT, and RDX in soil.

Table 7-39* presents the multiple pathway potential carcinogenic risk and noncarcinogenic hazard--1E-01 and 6E+03, respectively--for the future residential land

TABLE 7-39*

Multiple Pathway Potential Carcinogenic Risks and Noncarcinogenic Hazards at Site 5 --Future Residential Land Use Scenario

Pathway No.	Pathway Description	Risk	Hazard Index
1	Dermal Absorption of Contaminants in Soil	4E-04	7E+01
2	Incidental Ingestion of Soil	6E-05	6E+00
3	Inhalation of Dust	0E+00	0E+00
5	Ingestion of Groundwater	NA	NA
6	Inhalation of Volatile Contaminants Emitted From Groundwater During Showering	NA	NA
7	Dermal Absorption of Groundwater Contaminants During Showering	NA	NA
12	Consumption of Crops	1E-01	6E+03
	Total	1E-01 (a)	6E+03 (a)

"NA" - Pathway not applicable to or quantified for site.

* - Replaces original Table 7-39 in the Final Baseline RA; Dames & Moore, 1992a.

(a) - Final Baseline RA results were a multiple pathway total carcinogenic risk of 3E-01 and a hazard index of 6E+03 (Dames & Moore, 1992a).

use scenario at Site 5. These results are slightly less than those calculated in the Baseline RA (3E-01 and 1E+04, respectively (Dames & Moore, 1992a)). The crop ingestion pathway appears to present the greatest potential risk and hazard.

7.3.1.3* Site 36: Building 493 Paint Sludge Discharge Area. Tables 7-40* through 7-42* present the estimated carcinogenic intakes, noncarcinogenic intakes, potency factors, reference doses, potential risks, and potential hazards, as applicable, for incidental soil ingestion, dust inhalation, and crop ingestion (pathways 2, 3, and 12), respectively, for the future residential land use scenario at followup fieldwork Site 36.

Because potency factors are not available for any of the soil contaminants of concern at Site 36 via the oral exposure route, a carcinogenic risk is not calculated for inadvertent ingestion of contaminated soil or consumption of crops irrigated by contaminated groundwater or grown in contaminated soil (pathways 2 and 12). The total potential noncarcinogenic hazard for the soil ingestion pathway is 5E+00, due mainly to the presence of cadmium and cobalt. This is slightly less than the hazard index of 9E+00 calculated in the Baseline RA (Dames & Moore, 1992a).

As discussed in Section 7.1 of the Baseline RA, because this hazard index is between 1 and 10, the target organ effects of chronic oral exposure to cadmium and cobalt are further investigated. Cadmium primarily affects the kidney (see Appendix D of the Baseline RA). Data concerning the noncarcinogenic effects of chronic oral exposure to cobalt in humans and animals were not located in the literature cited in Appendix D. Subchronic exposure may cause adverse effects in the liver, lungs, gastrointestinal system, and thyroid. Therefore, the total hazard quotient of 5E+00 may be an overestimate and may be more appropriately segregated into a hazard quotient of 0.8 for cadmium and 4 for cobalt. In addition, it should be noted that the background concentration of cobalt (15 mg/kg) results in a hazard quotient of 5 for the soil ingestion pathway (see Appendix B of the Baseline RA); therefore, the potential hazard posed by cobalt at Site 36 may be a result of naturally occurring background levels.

TABLE 7-40*

Potential Carcinogenic Risks and Noncarcinogenic Hazards Due to Incidental Ingestion of Soil at Site 36 Future Residential Land Use Scenario

Analyte	Carcinogenic Intake (mg/kg/day)	Slope Factor 1/(mg/kg/day)	Risk
Cadmium	–	–	–
Chromium	–	–	–
Cobalt	–	–	–
Copper	–	–	–
Iron	–	–	–
Lead	–	–	–
Nickel	–	–	–
Silver	–	–	–
Zinc	–	–	–
Nitrite/nitrate	–	–	–
Total			0E+00 (a)

Analyte	Noncarcinogenic Intake (mg/kg/day)	Reference Dose (mg/kg/day)	Hazard Quotient
Cadmium	7.89E-04	1.0E-03	8E-01
Chromium	2.30E-04	5.0E-03	5E-02
Cobalt	4.20E-05	1.0E-05	4E+00
Copper	1.87E-04	3.7E-02	5E-03
Iron	8.11E-02	**	**
Lead	5.08E-04	**	**
Nickel	6.47E-05	2.0E-02	3E-03
Silver	1.15E-06	5.0E-03	2E-04
Zinc	2.58E-03	2.0E-01	1E-02
Nitrite/nitrate	3.00E-05	1.6E+00	2E-05
Total			5E+00 (a)

"–" - Not calculated because contaminant is not considered a carcinogen or potency factor is not available.

"**" - Reference dose is not available.

* - Replaces original Table 7-40 in the Final Baseline RA; Dames & Moore, 1992a.

(a) - Final Baseline RA results were a total potential carcinogenic risk of 0E+00 and a hazard index of 9E+00 (Dames & Moore, 1992a).

TABLE 7-41*

Potential Carcinogenic Risks and Noncarcinogenic Hazards Due to Inhalation of Dust at Site 36 Future Residential Land Use Scenario

Analyte	Carcinogenic Intake (mg/kg/day)	Slope Factor 1/(mg/kg/day)	Risk
Cadmium	1.95E-08	6.3E+00	1E-07
Chromium	5.67E-09	4.2E+01	2E-07
Cobalt	--	--	--
Copper	--	--	--
Iron	--	--	--
Lead	--	--	--
Nickel	1.59E-09	1.7E+00	3E-09
Silver	--	--	--
Zinc	--	--	--
Nitrite/nitrate	--	--	--
Total			4E-07 (a)

Analyte	Noncarcinogenic Intake (mg/kg/day)	Reference Dose (mg/kg/day)	Hazard Quotient
Cadmium	4.54E-08	**	**
Chromium	1.32E-08	6.0E-07	2E-02
Cobalt	2.42E-09	2.86E-04	8E-06
Copper	1.07E-08	**	**
Iron	4.67E-06	**	**
Lead	2.92E-08	**	**
Nickel	3.72E-09	**	**
Silver	6.62E-11	**	**
Zinc	1.49E-07	**	**
Nitrite/nitrate	1.73E-09	**	**
Total			2E-02 (a)

"--" - Not calculated because contaminant is not considered a carcinogen or potency factor is not available.

"**" - Reference dose is not available.

* - Replaces original Table 7-41 in the Final Baseline RA; Dames & Moore, 1992a.

(a) - Final Baseline RA results were a total potential carcinogenic risk of 8E-07 and a hazard index of 4E-02 (Dames & Moore, 1992a).

TABLE 7-42*

Potential Carcinogenic Risks and Noncarcinogenic Hazards Due to the Consumption of Crops at Site 36 Future Residential Land Use Scenario

Analyte	Carcinogenic Intake (mg/kg/day)	Slope Factor 1/(mg/kg/day)	Risk
Cadmium	–	–	–
Chromium	–	–	–
Cobalt	–	–	–
Copper	–	–	–
Iron	–	–	–
Lead	–	–	–
Nickel	–	–	–
Silver	–	–	–
Zinc	–	–	–
Nitrite/nitrate	–	–	–
Total			0E+00 (a)

Analyte	Noncarcinogenic Intake (mg/kg/day)	Reference Dose (mg/kg/day)	Hazard Quotient
Cadmium	1.42E-02	1.0E-03	1E+01
Chromium	6.90E-05	5.0E-03	1E-02
Cobalt	xx	1.0E-05	xx
Copper	xx	3.7E-02	xx
Iron	xx	**	xx
Lead	7.62E-04	**	**
Nickel	9.70E-04	2.0E-02	5E-02
Silver	xx	5.0E-03	xx
Zinc	xx	2.0E-01	xx
Nitrite/nitrate	xx	1.6E+00	xx
Total			1E+01 (a)

"–" - Not calculated because contaminant is not considered a carcinogen or potency factor is not available.

"xx" - Quantitative information on uptake factors not available.

"**" - Reference dose is not available.

* - Replaces original Table 7-42 in the Final Baseline RA; Dames & Moore, 1992a.

(a) - Final Baseline RA results were a total potential carcinogenic risk of 0E+00 and a hazard index of 3E+01 (Dames & Moore, 1992a).

The total potential carcinogenic risk and noncarcinogenic hazard for inhalation of contaminated soil as airborne dust (pathway 3) are 4E-07 and 2E-02, respectively. These results are slightly lower than those calculated in the Baseline RA (8E-07 and 4E-02, respectively (Dames & Moore, 1992a)). The total potential noncarcinogenic hazard for crop ingestion (pathway 12) is 1E+01, due mainly to the presence of cadmium. This is slightly less than the hazard index of 3E+01 calculated in the Baseline RA (Dames & Moore, 1992a).

Table 7-43* presents the multiple pathway potential carcinogenic risk and noncarcinogenic hazard--4E-07 and 2E+01, respectively--for the future residential land use scenario at Site 36. The crop ingestion pathway appears to present the greatest potential noncarcinogenic hazard. These results are slightly lower than those calculated in the Baseline RA (8E-07 and 4E+01, respectively (Dames & Moore, 1992a)).

7.3.1.4* Site 47: Boiler/Laundry Effluent Discharge Site. Tables 7-44* through 7-46* present the estimated carcinogenic intakes, noncarcinogenic intakes, potency factors, reference doses, potential risks, and potential hazards, as applicable, for dermal absorption of contaminants in soil, incidental soil ingestion, and dust inhalation (pathways 1, 2, and 3), respectively, for the future residential land use scenario at followup fieldwork Site 47.

The total potential carcinogenic risk for dermal absorption of contaminants in soil (pathway 1) is 7E-06, which is due to the presence of PCB 1260 in Site 47 soil. PCB 1260 is the only chemical evaluated for carcinogenic effects via this pathway. Because a reference dose for PCB 1260 is not available, a potential noncarcinogenic hazard index is not calculated.

The total potential carcinogenic risk and noncarcinogenic hazard for inadvertent ingestion of contaminated soil (pathway 2) are 2E-05 and 2, respectively. These results are unchanged from those calculated in the Baseline RA (Dames & Moore, 1992a). The potential carcinogenic risk of 2E-05 is due mainly to the presence of

TABLE 7-43*

Multiple Pathway Potential Carcinogenic Risks and Noncarcinogenic Hazards at Site 36 --Future Residential Land Use Scenario

Pathway No.	Pathway Description	Risk	Hazard Index
1	Dermal Absorption of Contaminants in Soil	NA	NA
2	Incidental Ingestion of Soil	0E+00	5E+00
3	Inhalation of Dust	4E-07	2E-02
5	Ingestion of Groundwater	NA	NA
6	Inhalation of Volatile Contaminants Emitted From Groundwater During Showering	NA	NA
7	Dermal Absorption of Groundwater Contaminants During Showering	NA	NA
12	Consumption of Crops	0E+00	1E+01
	Total	4E-07 (a)	2E+01 (a)

"NA" - Pathway not applicable to or quantified for site.

* - Replaces original Table 7-43 in the final Baseline RA; Dames & Moore, 1992a.

(a) - Final Baseline RA results were a total multiple pathway carcinogenic risk of 8E-07 and a hazard index of 4E+01 (Dames & Moore, 1992a).

TABLE 7-44*

Potential Carcinogenic Risks and Noncarcinogenic Hazards Due to Dermal Absorption of Contaminants in Soil at Site 47 Future Residential Land Use Scenario

Analyte	Carcinogenic Intake (mg/kg/day)	Slope Factor 1/(mg/kg/day)	Risk
PCB-1260	7.57E-07	8.6E+00	7E-06
Total			7E-06 (a)

Analyte	Noncarcinogenic Intake (mg/kg/day)	Reference Dose (mg/kg/day)	Hazard Quotient
PCB-1260	1.77E-06	**	**
Total			0E+00 (a)

**** - Reference dose is not available.

* - Replaces original Table 7-44 in the Final Baseline RA; Dames & Moore, 1992a.

(a) - Final Baseline RA results were a total potential carcinogenic risk of 6E-06 and a hazard index of 0E+00 (Dames & Moore, 1992a).

TABLE 7-45*

Potential Carcinogenic Risks and Noncarcinogenic Hazards Due to Incidental Ingestion of Soil at Site 47 Future Residential Land Use Scenario

Analyte	Carcinogenic Intake (mg/kg/day)	Slope Factor 1/(mg/kg/day)	Risk
Antimony	–	–	–
Barium	–	–	–
Cadmium	–	–	–
Calcium	–	–	–
Chromium	–	–	–
Copper	–	–	–
Lead	–	–	–
Magnesium	–	–	–
Mercury	–	–	–
Nickel	–	–	–
Selenium	–	–	–
Silver	–	–	–
Sodium	–	–	–
Zinc	–	–	–
Nitrite/nitrate	–	–	–
Benzo(a)anthracene	3.90E-07	5.8E+00	2E-06
Benzo(b)fluoranthene	7.03E-07	5.8E+00	4E-06
Benzo(k)fluoranthene	3.60E-07	5.8E+00	2E-06
Chrysene	7.53E-07	5.8E+00	4E-06
Di-n-butyl phthalate	–	–	–
Fluoranthene	–	–	–
Phenanthrene	–	–	–
Pyrene	–	–	–
Chlordane	4.74E-07	1.3E+00	6E-07
DDD	2.78E-07	2.4E-01	7E-08
DDE	1.10E-08	3.4E-01	4E-09
DDT	1.05E-07	3.4E-01	4E-08
Dieldrin	1.10E-08	1.6E+00	2E-08
PCB-1260	5.26E-07	7.7E+00	4E-06
Total			2E-05 (a)

Analyte	Noncarcinogenic Intake (mg/kg/day)	Reference Dose (mg/kg/day)	Hazard Quotient
Antimony	5.52E-04	4.0E-04	1E+00
Barium	1.72E-03	7.0E-02	2E-02
Cadmium	8.51E-05	1.0E-03	9E-02
Calcium	2.68E-01	**	**
Chromium	1.46E-04	5.0E-03	3E-02
Copper	9.64E-04	3.7E-02	3E-02
Lead	1.56E-03	**	**
Magnesium	5.83E-02	**	**
Mercury	2.04E-06	3.0E-04	7E-03
Nickel	1.72E-04	2.0E-02	9E-03
Selenium	9.53E-07	5.0E-03	2E-04
Silver	2.33E-06	5.0E-03	5E-04
Sodium	3.39E-03	**	**
Zinc	3.51E-03	2.0E-01	2E-02
Nitrite/nitrate	6.79E-05	1.6E+00	4E-05
Benzo(a)anthracene	9.10E-07	**	**
Benzo(b)fluoranthene	1.64E-06	**	**
Benzo(k)fluoranthene	8.40E-07	**	**
Chrysene	1.76E-06	**	**
Di-n-butyl phthalate	2.97E-06	1.0E-01	3E-05
Fluoranthene	1.07E-06	4.0E-02	3E-05
Phenanthrene	3.40E-07	**	**
Pyrene	1.19E-06	3.0E-02	4E-05
Chlordane	1.11E-06	6.0E-05	2E-02
DDD	6.43E-07	**	**
DDE	2.56E-08	**	**
DDT	2.45E-07	5.0E-04	5E-04
Dieldrin	2.56E-08	5.0E-05	5E-04
PCB-1260	1.23E-06	**	**
Total			2E+00 (a)

"–" - Not calculated because contaminant is not considered a carcinogen or potency factor is not available.

"**" - Reference dose is not available.

* - Replaces original Table 7-45 in the Final Baseline RA; Dames & Moore, 1992a.

(a) - Final Baseline RA results were the same as those shown in this table (Dames & Moore, 1992a).

TABLE 7-46*

Potential Carcinogenic Risks and Noncarcinogenic Hazards Due to Inhalation of Dust at Site 47 Future Residential Land Use Scenario

Analyte	Carcinogenic Intake (mg/kg/day)	Slope Factor 1/(mg/kg/day)	Risk
Antimony	–	–	–
Barium	–	–	–
Cadmium	2.30E-09	6.3E+00	1E-08
Calcium	–	–	–
Chromium	3.94E-09	4.2E+01	2E-07
Copper	–	–	–
Lead	–	–	–
Magnesium	–	–	–
Mercury	–	–	–
Nickel	4.64E-09	1.7E+00	8E-09
Selenium	–	–	–
Silver	–	–	–
Sodium	–	–	–
Zinc	–	–	–
Nitrite/nitrate	–	–	–
Benzo(a)anthracene	2.45E-11	6.1E+00	1E-10
Benzo(b)fluoranthene	4.42E-11	6.1E+00	3E-10
Benzo(k)fluoranthene	2.27E-11	6.1E+00	1E-10
Chrysene	4.74E-11	6.1E+00	3E-10
Di-n-butyl phthalate	–	–	–
Fluoranthene	–	–	–
Phenanthrene	–	–	–
Pyrene	–	–	–
Chlordane	2.98E-11	1.3E+00	4E-11
DDD	1.73E-11	–	–
DDE	6.90E-13	–	–
DDT	6.60E-12	3.4E-01	2E-12
Dieldrin	6.90E-13	1.6E+01	1E-11
PCB-1260	3.31E-11	–	–
Total			2E-07 (a)

Analyte	Noncarcinogenic Intake (mg/kg/day)	Reference Dose (mg/kg/day)	Hazard Quotient
Antimony	3.47E-08	--	--
Barium	1.08E-07	1.4E-04	8E-04
Cadmium	5.36E-09	--	--
Calcium	1.68E-05	--	--
Chromium	9.19E-09	6.0E-07	2E-02
Copper	6.07E-08	--	--
Lead	9.84E-08	--	--
Magnesium	3.67E-06	--	--
Mercury	1.28E-10	9.0E-05	1E-06
Nickel	1.08E-08	--	--
Selenium	6.00E-11	--	--
Silver	1.47E-10	--	--
Sodium	2.13E-07	--	--
Zinc	2.21E-07	--	--
Nitrite/nitrate	4.28E-09	--	--
Benzo(a)anthracene	5.72E-11	--	--
Benzo(b)fluoranthene	1.03E-10	--	--
Benzo(k)fluoranthene	5.29E-11	--	--
Chrysene	1.11E-10	--	--
Di-n-butyl phthalate	1.87E-10	--	--
Fluoranthene	6.76E-11	--	--
Phenanthrene	2.14E-11	--	--
Pyrene	7.47E-11	--	--
Chlordane	6.96E-11	--	--
DDD	4.05E-11	--	--
DDE	1.61E-12	--	--
DDT	1.54E-11	--	--
Dieldrin	1.61E-12	--	--
PCB-1260	7.72E-11	--	
Total			2E-02 (a)

"–" - Not calculated because contaminant is not considered a carcinogen or potency factor is not available.

"--" - Reference dose is not available.

* - Replaces original Table 7-46 in the Final Baseline RA; Dames & Moore, 1992a.

(a) - Final Baseline RA results were a total potential carcinogenic risk of 2E-07 and a hazard index of 1E-02 (Dames & Moore, 1992a).

various PAHs and PCB 1260 in site soil. The potential noncarcinogenic hazard of 2 is due mainly to the presence of antimony in site soil.

The total potential carcinogenic risk and noncarcinogenic hazard for inhalation of contaminated soil as airborne dust (pathway 3) are 2E-07 and 2E-02. These results are unchanged from those calculated in the Baseline RA (Dames & Moore, 1992a).

As discussed in Section 3.0*, no additional groundwater sampling was conducted at Site 47 during the followup fieldwork. Therefore, the carcinogenic intakes, noncarcinogenic intakes, potency factors, reference doses, potential risks, and potential hazards, as applicable, for groundwater ingestion, inhalation of VOCs from groundwater, and dermal absorption of contaminants in groundwater (pathways 5, 6, and 7) for the flood gravel and basalt aquifers are unchanged and are not included in the addendum.

Tables 7-47* and 7-48* present the estimated carcinogenic intakes, noncarcinogenic intakes, potency factors, reference doses, potential risks, and potential hazards, as applicable, for consumption of crops irrigated by contaminated groundwater or grown in contaminated soil (pathway 12) for the flood gravel and basalt aquifers, respectively, for the future residential land use scenario at Site 47.

The total potential carcinogenic risk and noncarcinogenic hazard for the crop ingestion pathway for the flood gravel aquifer are 3E-04 and 1E+01, respectively. These results are unchanged from those calculated in the Baseline RA (Dames & Moore, 1992a). The potential carcinogenic risk of 3E-04 is due mainly to the presence of various PAHs, PCB 1260, 2,4,6-TNT, 2,4-DNT, and RDX. The noncarcinogenic hazard of 1E+01 is due mainly to the presence of cadmium, 1,3,5-TNB, 2,4,6-TNT, and RDX. Cadmium primarily affects the kidney. Similarities between 1,3,5-TNB, 2,4,6-TNT, and RDX include adverse effects on the testes and spleen. Therefore, the hazard quotient of 1E+01 may be overestimated, and it may be more appropriate to segregate the hazard quotient of 2E+00 for cadmium from the hazard quotients for 1,3,5-TNB (4E+00), 2,4,6-TNT (3E+00), and RDX (1E+00), which can be summed based on similar target organ effects to obtain a hazard index of 8E+00.

TABLE 7-47*

Potential Carcinogenic Risks and Noncarcinogenic Hazards Due to the Consumption of Crops at Site 47--Flood Gravel Aquifer Future Residential Land Use Scenario

Analyte	Carcinogenic Intake (mg/kg/day)	Slope Factor 1/(mg/kg/day)	Risk
Antimony	--	--	--
Arsenic	3.41E-06	1.75E+00	6E-06
Barium	--	--	--
Beryllium	2.71E-07	4.3E+00	1E-06
Cadmium	--	--	--
Calcium	--	--	--
Chromium	--	--	--
Copper	--	--	--
Lead	--	--	--
Magnesium	--	--	--
Mercury	--	--	--
Nickel	--	--	--
Selenium	--	--	--
Silver	--	--	--
Sodium	--	--	--
Vanadium	--	--	--
Zinc	--	--	--
Nitrite/nitrate	--	--	--
135TNB	--	--	--
13DNB	--	--	--
246TNT	6.24E-04	3.0E-02	2E-05
24DNT	7.45E-05	6.8E-01	5E-05
26DNT	1.00E-06	6.8E-01	7E-07
HMX	--	--	--
RDX	1.23E-03	1.1E-01	1E-04
Nitrobenzene	--	--	--
Tetryl	--	--	--
Trichloroethylene	1.31E-06	1.1E-02	1E-08
Benzo(a)anthracene	3.91E-06	5.8E+00	2E-05
Benzo(b)fluoranthene	2.63E-06	5.8E+00	2E-05
Benzo(k)fluoranthene	4.66E-07	5.8E+00	3E-06
Chrysene	4.99E-06	5.8E+00	3E-05
Di-n-butyl phthalate	--	--	--
Fluoranthene	--	--	--
Phenanthrene	--	--	--
Pyrene	8.66E-06	--	--
Chlordane	3.46E-06	1.3E+00	4E-06
DDD	1.96E-06	2.4E-01	5E-07
DDE	6.55E-08	3.4E-01	2E-08
DDT	2.57E-07	3.4E-01	9E-08
Dieldrin	2.68E-08	1.6E+01	4E-07
PCB-1260	1.87E-06	7.7E+00	1E-05
Total			3E-04 (a)

TABLE 7-47* (cont'd)

Potential Carcinogenic Risks and Noncarcinogenic Hazards Due to the Consumption of Crops at Site 47–Flood Gravel Aquifer Future Residential Land Use Scenario

Analyte	Noncarcinogenic Intake (mg/kg/day)	Reference Dose (mg/kg/day)	Hazard Quotient
Antimony	xx	4.0E-04	xx
Arsenic	7.96E-06	3.0E-04	3E-02
Barium	xx	7.0E-02	xx
Beryllium	6.32E-07	5.0E-03	1E-04
Cadmium	1.53E-03	1.0E-03	2E+00
Calcium	xx	**	**
Chromium	4.38E-05	5.0E-03	9E-03
Copper	xx	3.7E-02	xx
Lead	2.35E-03	**	**
Magnesium	xx	**	xx
Mercury	5.52E-05	3.0E-04	2E-01
Nickel	2.58E-03	2.0E-02	1E-01
Selenium	xx	5.0E-03	xx
Silver	xx	5.0E-03	xx
Sodium	xx	**	xx
Vanadium	xx	7.0E-03	xx
Zinc	xx	2.0E-01	xx
Nitrite/nitrate	xx	1.6E+00	xx
135TNB	1.80E-04	5.0E-05	4E+00
13DNB	5.05E-06	1.0E-04	5E-02
246TNT	1.46E-03	5.0E-04	3E+00
24DNT	1.74E-04	2.0E-03	9E-02
26DNT	2.33E-06	1.0E-03	2E-03
HMX	6.75E-04	5.0E-02	1E-02
RDX	2.88E-03	3.0E-03	1E+00
Nitrobenzene	5.24E-06	5.0E-04	1E-02
Tetryl	1.69E-06	1.0E-02	2E-04
Trichloroethylene	3.06E-06	**	**
Benzo(a)anthracene	9.12E-06	**	**
Benzo(b)fluoranthene	6.14E-06	**	**
Benzo(k)fluoranthene	1.09E-06	**	**
Chrysene	1.16E-05	**	**
Di-n-butyl phthalate	2.00E-05	1.0E-01	2E-04
Fluoranthene	1.04E-05	4.0E-02	3E-04
Phenanthrene	1.04E-05	**	**
Pyrene	2.02E-05	3.0E-02	7E-04
Chlordane	8.07E-06	6.0E-05	1E-01
DDD	4.57E-06	**	**
DDE	1.53E-07	**	**
DDT	6.00E-07	5.0E-04	1E-03
Dieldrin	6.26E-08	5.0E-05	1E-03
PCB-1260	4.37E-06	**	**
Total			1E+01 (a)

"–" - Not calculated because contaminant is not considered a carcinogen or potency factor is not available.
"xx" - Quantitative information on uptake factors not available.
"**" - Reference dose is not available.
* - Replaces original Table 7-47 in the Final Baseline RA; Dames & Moore, 1992a.
(a) - Final Baseline RA results were the same as those shown in this table (Dames & Moore, 1992a).

TABLE 7-48*

Potential Carcinogenic Risks and Noncarcinogenic Hazards Due to the Consumption of Crops at Site 47--Basalt Aquifer Future Residential Land Use Scenario

Analyte	Carcinogenic Intake (mg/kg/day)	Slope Factor 1/(mg/kg/day)	Risk
Antimony	--	--	--
Barium	--	--	--
Cadmium	--	--	--
Calcium	--	--	--
Chromium	--	--	--
Copper	--	--	--
Lead	--	--	--
Magnesium	--	--	--
Mercury	--	--	--
Nickel	--	--	--
Selenium	--	--	--
Silver	--	--	--
Sodium	--	--	--
Zinc	--	--	--
Nitrite/nitrate	--	--	--
135TNB	--	--	--
13DNB	--	--	--
246TNT	2.12E-04	3.0E-02	6E-06
24DNT	3.29E-05	6.8E-01	2E-05
HMX	--	--	--
RDX	3.21E-03	1.1E-01	4E-04
Benzo(a)anthracene	2.58E-06	5.8E+00	1E-05
Benzo(b)fluoranthene	2.63E-06	5.8E+00	2E-05
Benzo(k)fluoranthene	4.66E-07	5.8E+00	3E-06
Chrysene	4.99E-06	5.8E+00	3E-05
Di-n-butyl phthalate	--	--	--
Fluoranthene	--	--	--
Phenanthrene	--	--	--
Pyrene	--	--	--
Chlordane	3.46E-06	1.3E+00	4E-06
DDD	1.96E-06	2.4E-01	5E-07
DDE	6.55E-08	3.4E-01	2E-08
DDT	2.57E-07	3.4E-01	9E-08
Dieldrin	3.65E-07	1.60E+01	6E-06
PCB-1260	1.87E-06	7.7E+00	1E-05
Total			5E-04 (a)

TABLE 7-48* (cont'd)

Potential Carcinogenic Risks and Noncarcinogenic Hazards Due to the Consumption of Crops at Site 47–Basalt Aquifer Future Residential Land Use Scenario

Analyte	Noncarcinogenic Intake (mg/kg/day)	Reference Dose (mg/kg/day)	Hazard Quotient
Antimony	xx	4.0E-04	xx
Barium	xx	7.0E-02	xx
Cadmium	1.53E-03	1.0E-03	2E+00
Calcium	xx	**	**
Chromium	4.38E-05	5.0E-03	9E-03
Copper	xx	3.7E-02	xx
Lead	2.35E-03	**	**
Magnesium	xx	**	xx
Mercury	5.51E-05	3.0E-04	2E-01
Nickel	2.58E-03	2.0E-02	1E-01
Selenium	xx	5.0E-03	xx
Silver	xx	5.0E-03	xx
Sodium	xx	**	xx
Zinc	xx	2.0E-01	xx
Nitrite/nitrate	xx	1.6E+00	xx
135TNB	5.53E-05	5.0E-05	1E+00
13DNB	1.75E-06	1.0E-04	2E-02
246TNT	4.94E-04	5.0E-04	1E+00
24DNT	7.68E-05	2.0E-03	4E-02
HMX	5.40E-04	5.0E-02	1E-02
RDX	7.49E-03	3.0E-03	2E+00
Benzo(a)anthracene	6.02E-06	**	**
Benzo(b)fluoranthene	6.14E-06	**	**
Benzo(k)fluoranthene	1.09E-06	**	**
Chrysene	1.16E-05	**	**
Di-n-butyl phthalate	2.00E-05	1.0E-01	2E-04
Fluoranthene	1.04E-05	4.0E-02	3E-04
Phenanthrene	1.04E-05	**	**
Pyrene	2.02E-05	3.0E-02	7E-04
Chlordane	8.07E-06	6.0E-05	1E-01
DDD	4.57E-06	**	**
DDE	1.53E-07	**	**
DDT	6.00E-07	5.0E-04	1E-03
Dieldrin	8.51E-07	5.0E-05	2E-02
PCB-1260	4.37E-06	**	**
Total			7E+00 (a)

"–" - Not calculated because contaminant is not considered a carcinogen or potency factor is not available.
"xx" - Quantitative information on uptake factors not available.
"**" - Reference dose is not available.
* - Replaces original Table 7-48 in the Final Baseline RA; Dames & Moore, 1992a.
(a) Final Baseline RA results were the same as those shown in this table (Dames & Moore, 1992a).

The total potential carcinogenic risk and noncarcinogenic hazard for pathway 12 for the basalt aquifer are 5E-04 and 7E+00, respectively. These results are unchanged from those calculated in the Baseline RA (Dames & Moore, 1992a). The potential carcinogenic risk of 5E-04 is due mainly to the presence of various PAHs, PCB 1260, and RDX. The potential noncarcinogenic hazard of 7E+00 is due mainly to the presence of RDX, 1,3,5-TNB, cadmium, and 2,4,6-TNT. However, based on the rationale provided above for the flood gravel aquifer, the total hazard index of 7E+00 may be overestimated. The hazard quotient for cadmium (2) should be considered separately, and the hazard quotients for 1,3,5-TNB (1), 2,4,6-TNT (1), and RDX (2) should be summed to obtain a hazard index of 4E+00.

Tables 7-49* and 7-50* present the multiple pathway potential carcinogenic risks and noncarcinogenic hazards for the flood gravel and basalt aquifers, respectively, for the future residential land use scenario at Site 47. The multiple pathway potential carcinogenic risk and noncarcinogenic hazard are 2E-03 and 7E+01, respectively, for the flood gravel aquifer. For the basalt aquifer, the multiple pathway potential carcinogenic risk and noncarcinogenic hazard are 4E-03 and 4E+01, respectively. These results are unchanged from those calculated in the Baseline RA (Dames & Moore, 1992a). Groundwater ingestion and crop ingestion (pathways 5 and 12) appear to present the greatest potential risk and the greatest potential noncarcinogenic hazard for both the flood gravel and basalt aquifers.

7.3.2* Operable Unit B: Ammunition Demolition Activity Area

7.3.2.4* Site 15: TNT Sludge Burial and Burn Area. Tables 7-75* through 7-77* present the estimated carcinogenic intakes, noncarcinogenic intakes, potency factors, reference doses, potential risks, and potential hazards, as applicable, for dermal absorption of contaminants in soil, incidental soil ingestion, and dust inhalation (pathways 1, 2, and 3), respectively, for the future residential land use scenario at followup fieldwork Site 15.

The total potential carcinogenic risk and noncarcinogenic hazard for dermal absorption of contaminants in soil (pathway 1) are 7E-05 and 1E+01, respectively.

TABLE 7-49*

Multiple Pathway Potential Carcinogenic Risks and Noncarcinogenic Hazards at Site 47 Flood Gravel Aquifer--Future Residential Land Use Scenario

Pathway No.	Pathway Description	Risk	Hazard Index
1	Dermal Absorption of Contaminants in Soil	7E-06	0E+00
2	Incidental Ingestion of Soil	2E-05	2E+00
3	Inhalation of Dust	2E-07	2E-02
5	Ingestion of Groundwater	2E-03	6E+01
6	Inhalation of Volatile Contaminants Emitted From Groundwater During Showering	2E-06	0E+00
7	Dermal Absorption of Groundwater Contaminants During Showering	4E-06	1E-01
12	Consumption of Crops	3E-04	1E+01
	Total	2E-03 (a)	7E+01 (a)

"NA" - Pathway not applicable to or quantified for site.

* - Replaces original Table 7-49 in the Final Baseline RA; Dames & Moore, 1992a.

(a) Results are unchanged from those presented in the Final Baseline RA (Dames & Moore, 1992a).

TABLE 7-50*

Multiple Pathway Potential Carcinogenic Risks and Noncarcinogenic Hazards at Site 47 Basalt Aquifer--Future Residential Land Use Scenario

Pathway No.	Pathway Description	Risk	Hazard Index
1	Dermal Absorption of Contaminants in Soil	7E-06	0E+00
2	Incidental Ingestion of Soil	2E-05	2E+00
3	Inhalation of Dust	2E-07	2E-02
5	Ingestion of Groundwater	3E-03	3E+01
6	Inhalation of Volatile Contaminants Emitted From Groundwater During Showering	NA	NA
7	Dermal Absorption of Groundwater Contaminants During Showering	3E-06	5E-02
12	Consumption of Crops	5E-04	7E+00
	Total	4E-03 (a)	4E+01 (a)

"NA" - Pathway not applicable to or quantified for site.

* - Replaces original Table 7-50 in the Final Baseline RA; Dames & Moore, 1992a.

(a) Results are unchanged from those presented in the Final Baseline RA (Dames & Moore, 1992a).

TABLE 7-75*

Potential Carcinogenic Risks and Noncarcinogenic Hazards Due to Dermal Absorption of Contaminants in Soil at Site 15 Future Residential Land Use Scenario

Analyte	Carcinogenic Intake (mg/kg/day)	Slope Factor 1/(mg/kg/day)	Risk
135TNB	--	--	--
246TNT	1.79E-03	3.0E-02	5E-05
HMX	--	--	--
RDX	0.00E+00 (a)	1.1E-01	0E+00
24DNT	2.82E-05	6.8E-01	2E-05
26DNT	2.10E-06	6.8E-01	1E-06
Total			7E-05 (b)

Analyte	Noncarcinogenic Intake (mg/kg/day)	Reference Dose (mg/kg/day)	Hazard Quotient
135TNB	1.28E-04	5.0E-05	3E+00
246TNT	4.17E-03	5.0E-04	8E+00
HMX	4.87E-04	5.0E-02	1E-02
RDX	0.00E+00 (a)	3.0E-03	0E+00
24DNT	6.58E-05	2.0E-03	3E-02
26DNT	4.91E-06	1.0E-03	5E-03
Total			1E+01 (b)

(a) - Because RDX is not dermally absorbed, the carcinogenic and noncarcinogenic intakes are zero.

(b) Final Baseline RA results were a total potential carcinogenic risk of 1E-04 and a hazard index of 2E+01 (Dames & Moore, 1992a).

"--" - Not calculated because contaminant is not considered a carcinogen or potency factor is not available.

* - Replaces original Table 7-75 in the Final Baseline RA; Dames & Moore, 1992a.

TABLE 7-76*

Potential Carcinogenic Risks and Noncarcinogenic Hazards Due to Incidental Ingestion of Soil at Site 15 Future Residential Land Use Scenario

Analyte	Carcinogenic Intake (mg/kg/day)	Slope Factor 1/(mg/kg/day)	Risk
Antimony	--	--	--
Arsenic	1.41E-05	1.75E+00	2E-05
Barium	--	--	--
Beryllium	7.08E-06	4.3E+00	3E-05
Cadmium	--	--	--
Chromium	--	--	--
Cobalt	--	--	--
Copper	--	--	--
Iron	--	--	--
Lead	--	--	--
Magnesium	--	--	--
Manganese	--	--	--
Mercury	--	--	--
Nickel	--	--	--
Potassium	--	--	--
Selenium	--	--	--
Silver	--	--	--
Sodium	--	--	--
Thallium	--	--	--
Zinc	--	--	--
135TNB	--	--	--
246TNT	1.49E-04	3.0E-02	4E-06
HMX	--	--	--
RDX	7.51E-05	1.1E-01	8E-06
24DNT	2.35E-06	6.8E-01	2E-06
26DNT	1.75E-07	6.8E-01	1E-07
Nitrite/nitrate	--	--	--
Total			7E-05 (a)

Analyte	Noncarcinogenic Intake (mg/kg/day)	Reference Dose (mg/kg/day)	Hazard Quotient
Antimony	3.46E-03	4.0E-04	9E+00
Arsenic	3.29E-05	3.0E-04	1E-01
Barium	8.53E-03	7.0E-02	1E-01
Beryllium	1.65E-05	5.0E-03	3E-03
Cadmium	2.98E-03	1.0E-03	3E+00
Chromium	7.46E-03	5.0E-03	1E+00
Cobalt	2.86E-04	1.0E-05	3E+01
Copper	3.78E-03	3.7E-02	1E-01
Iron	1.98E-01	**	**
Lead	1.46E-03	**	**
Magnesium	2.97E-02	**	**
Manganese	3.16E-03	1.0E-01	3E-02
Mercury	2.70E-07	3.0E-04	9E-04
Nickel	3.73E-04	2.0E-02	2E-02
Potassium	7.32E-03	**	**
Selenium	6.10E-06	5.0E-03	1E-03
Silver	2.47E-06	5.0E-03	5E-04
Sodium	3.15E-03	**	**
Thallium	7.82E-04	8.0E-05	1E+01
Zinc	2.73E-02	2.0E-01	1E-01
135TNB	1.07E-05	5.0E-05	2E-01
246TNT	3.47E-04	5.0E-04	7E-01
HMX	4.05E-05	5.0E-02	8E-04
RDX	1.75E-04	3.0E-03	6E-02
24DNT	5.48E-06	2.0E-03	3E-03
26DNT	4.09E-07	1.0E-03	4E-04
Nitrite/nitrate	2.96E-04	1.6E+00	2E-04
Total			5E+01 (a)

"--" - Not calculated because contaminant is not considered a carcinogen or potency factor is not available.

"**" - Reference dose is not available.

* - Replaces original Table 7-76 in the Final Baseline RA; Dames & Moore, 1992a.

(a) Final Baseline RA results were a total potential carcinogenic risk of 2E-04 and a hazard index of 2E+02 (Dames & Moore, 1992a).

TABLE 7-77*

Potential Carcinogenic Risks and Noncarcinogenic Hazards Due to Inhalation of Dust at Site 15 Future Residential Land Use Scenario

Analyte	Carcinogenic Intake (mg/kg/day)	Slope Factor 1/(mg/kg/day)	Risk
Antimony	–	–	–
Arsenic	3.65E-09	1.4E+01	5E-08
Barium	–	–	–
Beryllium	1.83E-09	8.4E+00	2E-08
Cadmium	3.31E-07	6.3E+00	2E-06
Chromium	8.27E-07	4.2E+01	3E-05
Cobalt	–	–	–
Copper	–	–	–
Iron	–	–	–
Lead	–	–	–
Magnesium	–	–	–
Manganese	–	–	–
Mercury	–	–	–
Nickel	4.13E-08	1.7E+00	7E-08
Potassium	–	–	–
Selenium	–	–	–
Silver	–	–	–
Sodium	–	–	–
Thallium	–	–	–
Zinc	–	–	–
135TNB	–	–	–
246TNT	3.85E-08	–	–
HMX	–	–	–
RDX	1.94E-08	–	–
24DNT	6.08E-10	–	–
26DNT	4.54E-11	–	–
Nitrite/nitrate	–	–	–
Total			4E-05 (a)

Analyte	Noncarcinogenic Intake (mg/kg/day)	Reference Dose (mg/kg/day)	Hazard Quotient
Antimony	8.95E-07	**	**
Arsenic	8.52E-09	**	**
Barium	2.21E-06	1.4E-04	2E-02
Beryllium	4.27E-09	**	**
Cadmium	7.72E-07	**	**
Chromium	1.93E-06	6.0E-07	3E+00
Cobalt	7.40E-08	2.86E-04	3E-04
Copper	9.78E-07	**	**
Iron	5.12E-05	**	**
Lead	3.79E-07	**	**
Magnesium	7.70E-06	**	**
Manganese	8.19E-07	1.0E-04	8E-03
Mercury	6.99E-11	9.0E-05	8E-07
Nickel	9.64E-08	**	**
Potassium	1.89E-06	**	**
Selenium	1.58E-09	**	**
Silver	6.39E-10	**	**
Sodium	8.14E-07	**	**
Thallium	2.02E-07	**	**
Zinc	7.07E-06	**	**
135TNB	2.77E-09	**	**
246TNT	8.99E-08	**	**
HMX	1.05E-08	**	**
RDX	4.54E-08	**	**
24DNT	1.42E-09	**	**
26DNT	1.06E-10	**	**
Nitrite/nitrate	7.66E-08	**	**
Total			3E+00 (a)

"–" - Not calculated because contaminant is not considered a carcinogen or potency factor is not available.

"**" - Reference dose is not available.

* - Replaces original Table 7-77 in the Baseline RA; Dames & Moore, 1992a.

(a) Final Baseline RA results were a total potential carcinogenic risk of 1E-04 and a hazard index of 1E+01 (Dames & Moore, 1992a).

These results are slightly lower than those calculated in the Baseline RA (1E-04 and 2E+01, respectively (Dames & Moore, 1992a)). The potential carcinogenic risk of 7E-05 is due mainly to the presence of 2,4,6-TNT and 2,4-DNT. 2,4-DNT was not detected at Site 15 prior to the followup fieldwork. The potential noncarcinogenic hazard of 1E+01 is due mainly to the presence of 1,3,5-TNB and 2,4,6-TNT.

The total potential carcinogenic risk and noncarcinogenic hazard for inadvertent ingestion of contaminated soil (pathway 2) are 7E-05 and 5E+01, respectively. These results are slightly lower than those calculated in the Baseline RA (2E-04 and 2E+02, respectively (Dames & Moore, 1992a)). The potential carcinogenic risk of 7E-05 is due mainly to the presence of arsenic, beryllium, and RDX. The potential noncarcinogenic hazard of 5E+01 is due mainly to the presence of thallium, cobalt, chromium, cadmium, and antimony.

The total potential carcinogenic risk and noncarcinogenic hazard for inhalation of contaminated soil as airborne dust (pathway 3) are 4E-05 and 3, respectively, which are due mainly to the presence of chromium in Site 15 soil. These results are slightly lower than those calculated in the Baseline RA (1E-04 and 1E+01, respectively (Dames & Moore, 1992a)). Because the hazard quotient for chromium is the primary contributor to the hazard index, the segregation of chemicals by target organ effects is not investigated.

Tables 7-78--which presents the carcinogenic intakes, noncarcinogenic intakes, potency factors, reference doses, potential risks, and potential hazards, as applicable, for groundwater ingestion (pathway 5) for the future residential land use scenario at Site 55 and followup fieldwork Site 15--is not included in this addendum, because no additional groundwater sampling was conducted at these sites during the followup fieldwork.

Table 7-79* presents the estimated carcinogenic intakes, noncarcinogenic intakes, potency factors, reference doses, potential risks, and potential hazards, as applicable, for consumption of crops irrigated by contaminated groundwater or grown in contaminated soil (pathway 12) for the future residential land use scenario at

TABLE 7-79*

Potential Carcinogenic Risks and Noncarcinogenic Hazards Due to the Consumption of Crops at Site 15 Future Residential Land Use Scenario

Analyte	Carcinogenic Intake (mg/kg/day)	Slope Factor 1/(mg/kg/day)	Risk (a)
Antimony	–	–	–
Arsenic	1.69E-05	1.75E+00	3E-05
Barium	–	–	–
Beryllium	2.12E-06	4.30E+00	9E-06
Cadmium	–	–	–
Chromium	–	–	–
Cobalt	–	–	–
Copper	–	–	–
Iron	–	–	–
Lead	–	–	–
Magnesium	–	–	–
Manganese	–	–	–
Mercury	–	–	–
Nickel	–	–	–
Potassium	–	–	–
Selenium	–	–	–
Silver	–	–	–
Sodium	–	–	–
Thallium	–	–	–
Zinc	–	–	–
135TNB	–	–	–
246TNT	1.21E-01	3.00E-02	4E-03
HMX	–	–	–
RDX	2.74E-01	1.10E-01	3E-02
24DNT	1.96E-03	6.80E-01	1E-03
26DNT	1.65E-04	6.80E-01	1E-04
Nitrite/nitrate	–	–	–
Total			3E-02 (b)

Analyte	Noncarcinogenic Intake (mg/kg/day)	Reference Dose (mg/kg/day)	Hazard Quotient
Antimony	xx	4.0E-04	xx
Arsenic	3.95E-05	3.0E-04	1E-01
Barium	xx	7.0E-02	xx
Beryllium	4.95E-06	5.0E-03	1E-03
Cadmium	5.37E-02	1.0E-03	5E+01
Chromium	2.24E-03	5.0E-03	4E-01
Cobalt	xx	1.0E-05	xx
Copper	xx	3.7E-02	xx
Iron	xx	**	xx
Lead	2.20E-03	**	**
Magnesium	xx	**	xx
Manganese	xx	1.0E-01	xx
Mercury	7.30E-06	3.0E-04	2E-02
Nickel	5.59E-03	2.0E-02	3E-01
Potassium	xx	**	xx
Selenium	xx	5.0E-03	xx
Silver	xx	5.0E-03	xx
Sodium	xx	**	xx
Thallium	xx	8.0E-05	xx
Zinc	xx	2.0E-01	xx
135TNB	2.59E-02	5.0E-05	5E+02
246TNT	2.82E-01	5.0E-04	6E+02
HMX	3.33E-01	5.0E-02	7E+00
RDX	6.40E-01	3.0E-03	2E+02
24DNT	4.56E-03	2.0E-03	2E+00
26DNT	3.84E-04	1.0E-03	4E-01
Nitrite/nitrate	xx	1.6E+00	xx
Total			1E+03 (b)

(a) - Since chemical intakes for this pathway are expected to be high, the one-hit equation is used to estimate carcinogenic risks instead of the linear low-dose cancer risk equation.

(b) - Final Baseline RA results were a total potential carcinogenic risk of 8E-02 and a hazard index of 2E+03 (Dames & Moore, 1992a).

"–" - Not calculated because contaminant is not considered a carcinogen or potency factor is not available.

"xx" - Quantitative information on uptake factors not available.

"**" - Reference dose is not available.

* - Replaces original Table 7-79 in the Final Baseline RA; Dames & Moore, 1992a.

Site 15. The total potential carcinogenic risk and noncarcinogenic hazard for pathway 12 are 3E-02 and 1E+03, respectively. Because potential carcinogenic risks for this pathway are high (i.e., greater than 1E-02) using the low-dose cancer risk equation, the one-hit equation (see Section 7.1 of the Baseline RA) is used to estimate carcinogenic risks. These results are slightly lower than those calculated in the Baseline RA (8E-02 and 2E+03, respectively (Dames & Moore, 1992a)). The potential carcinogenic risk of 3E-02 is due mainly to the presence of 2,4-DNT and 2,6-DNT in soil. Neither of these contaminants was detected until the followup fieldwork was performed. RDX was the primary contributor to risks calculated in the Baseline RA (Dames & Moore, 1992a). The potential noncarcinogenic hazard of 1E+03 is due mainly to the presence of cadmium, 2,4,6-TNT, 1,3,5-TNB, RDX, HMX, and 2,4-DNT in soil. 2,4-DNT was not detected in the Baseline RA (Dames & Moore, 1992a).

Table 7-80* presents the multiple pathway potential carcinogenic risk and noncarcinogenic hazard for the future residential land use scenario at Site 15, which are 3E-02 and 1E+03, respectively. These results are slightly lower than those calculated in the Baseline RA (8E-02 and 2E+03, respectively (Dames & Moore, 1992a)). The crop ingestion pathway appears to present the greatest potential risk and hazard.

Table 7-81* presents the estimated carcinogenic intakes, noncarcinogenic intakes, potency factors, reference doses, potential risks, and potential hazards, as applicable, for inhalation of contaminated soil as airborne dust (pathway 3) for the future military (tank training) land use scenario at Site 15. The total potential carcinogenic risk and noncarcinogenic hazard are 7E-05 and 6E+01, respectively, which are mainly the result of the presence of chromium in Site 15 soil. These results are slightly lower than those calculated in the Baseline RA (3E-04 and 2E+02, respectively).

7.3.2.6* <u>Site 17: Aboveground Open Detonation Area</u>. Tables 7-89* through 7-92* present the estimated carcinogenic intakes, noncarcinogenic intakes, potency factors, reference doses, potential risks, and potential hazards, as applicable, for dermal

TABLE 7-80*

Multiple Pathway Potential Carcinogenic Risks and Noncarcinogenic Hazards at Site 15 –Future Residential Land Use Scenario

Pathway No.	Pathway Description	Risk	Hazard Index
1	Dermal Absorption of Contaminants in Soil	7E-05	1E+01
2	Incidental Ingestion of Soil	7E-05	5E+01
3	Inhalation of Dust	4E-05	3E+00
5	Ingestion of Groundwater	3E-04	2E+00
6	Inhalation of Volatile Contaminants Emitted From Groundwater During Showering	NA	NA
7	Dermal Absorption of Groundwater Contaminants During Showering	NA	NA
12	Consumption of Crops	3E-02	1E+03
	Total	3E-02 (a)	1E+03 (a)

(a) - Final Baseline RA results were a total multiple pathway carcinogenic risk and a hazard index of 8E-02 and 2E+03, respectively.

"NA" - Pathway not applicable to or quantified for site.

* - Replaces original Table 7-80 in the Final Baseline RA; Dames & Moore, 1992a.

TABLE 7-81*

Potential Carcinogenic Risks and Noncarcinogenic Hazards Due to Inhalation of Dust at Site 15 Future Military Land Use Scenario

Analyte	Carcinogenic Intake (mg/kg/day)	Slope Factor 1/(mg/kg/day)	Risk
Antimony	--	--	--
Arsenic	7.26E-09	1.4E+01	1E-07
Barium	--	--	--
Beryllium	3.64E-09	8.4E+00	3E-08
Cadmium	6.59E-07	6.3E+00	4E-06
Chromium	1.65E-06	4.2E+01	7E-05
Cobalt	--	--	--
Copper	--	--	--
Iron	--	--	--
Lead	--	--	--
Magnesium	--	--	--
Manganese	--	--	--
Mercury	--	--	--
Nickel	8.22E-08	1.7E+00	1E-07
Potassium	--	--	--
Selenium	--	--	--
Silver	--	--	--
Sodium	--	--	--
Thallium	--	--	--
Zinc	--	--	--
135TNB	--	--	--
246TNT	7.67E-08	--	--
HMX	--	--	--
RDX	3.87E-08	--	--
24DNT	1.21E-09	--	--
26DNT	9.03E-11	--	--
Nitrite/nitrate	--	--	--
Total			7E-05 (a)

Analyte	Noncarcinogenic Intake (mg/kg/day)	Reference Dose (mg/kg/day)	Hazard Quotient
Antimony	1.78E-05	**	**
Arsenic	1.70E-07	**	**
Barium	4.39E-05	1.4E-04	3E-01
Beryllium	8.50E-08	**	**
Cadmium	1.54E-05	**	**
Chromium	3.84E-05	6.0E-07	6E+01
Cobalt	1.47E-06	2.86E-04	5E-03
Copper	1.95E-05	**	**
Iron	1.02E-03	**	**
Lead	7.54E-06	**	**
Magnesium	1.53E-04	**	**
Manganese	1.63E-05	1.0E-04	2E-01
Mercury	1.39E-09	9.0E-05	2E-05
Nickel	1.92E-06	**	**
Potassium	3.77E-05	**	**
Selenium	3.14E-08	**	**
Silver	1.27E-08	**	**
Sodium	1.62E-05	**	**
Thallium	4.03E-06	**	**
Zinc	1.41E-04	**	**
135TNB	5.51E-08	**	**
246TNT	1.79E-06	**	**
HMX	2.09E-07	**	**
RDX	9.03E-07	**	**
24DNT	2.82E-08	**	**
26DNT	2.11E-09	**	**
Nitrite/nitrate	1.52E-06	**	**
Total			6E+01 (a)

"--" - Not calculated because contaminant is not considered a carcinogen or potency factor is not available.

"**" - Reference dose is not available.

* - Replaces original Table 7-81 in the Final Baseline RA; Dames & Moore, 1992a.

(a) Final Baseline RA results were a total potential carcinogenic risk of 3E-04 and a hazard index of 2E+02 (Dames & Moore, 1992a).

TABLE 7-89*

Potential Carcinogenic Risks and Noncarcinogenic Hazards Due to Dermal Absorption of Contaminants in Soil at Site 17 Future Residential Land Use Scenario

Analyte	Carcinogenic Intake (mg/kg/day)	Slope Factor 1/(mg/kg/day)	Risk
246TNT	3.04E-05	3.0E-02	9E-07
HMX	--	--	--
RDX	0.00E+00 (a)	1.1E-01	0E+00
Total			9E-07 (b)

Analyte	Noncarcinogenic Intake (mg/kg/day)	Reference Dose (mg/kg/day)	Hazard Quotient
246TNT	7.10E-05	5.0E-04	1E-01
HMX	4.56E-05	5.0E-02	9E-04
RDX	0.00E+00 (a)	3.0E-03	0E+00
Total			1E-01 (b)

(a) - Because RDX is not dermally absorbed, the carcinogenic and noncarcinogenic intakes are zero.

(b) - Final Baseline RA results were a total potential carcinogenic risk of 2E-06 and a hazard index of 3E-01 (Dames & Moore, 1992a).

"--" - Not calculated because contaminant is not considered a carcinogen or potency factor is not available.

* - Replaces original Table 7-89 in the Final Baseline RA; Dames & Moore, 1992a.

TABLE 7-90*

Potential Carcinogenic Risks and Noncarcinogenic Hazards Due to Incidental Ingestion of Soil at Site 17 Future Residential Land Use Scenario

Analyte	Carcinogenic Intake (mg/kg/day)	Slope Factor 1/(mg/kg/day)	Risk
Antimony	--	--	--
Beryllium	3.13E-06	4.3E+00	1E-05
Cadmium	--	--	--
Cobalt	--	--	--
Copper	--	--	--
Iron	--	--	--
Lead	--	--	--
Mercury	--	--	--
Nickel	--	--	--
Silver	--	--	--
Zinc	--	--	
246TNT	2.54E-06	3.0E-02	8E-08
HMX	--	--	--
RDX	1.04E-05	1.1E-01	1E-06
Total			1E-05 (a)

Analyte	Noncarcinogenic Intake (mg/kg/day)	Reference Dose (mg/kg/day)	Hazard Quotient
Antimony	1.67E-04	4.0E-04	4E-01
Beryllium	7.31E-06	5.0E-03	1E-03
Cadmium	1.14E-05	1.0E-03	1E-02
Cobalt	5.77E-05	1.0E-05	6E+00
Copper	6.10E-04	3.7E-02	2E-02
Iron	1.63E-01	**	**
Lead	3.06E-03	**	**
Mercury	1.94E-07	3.0E-04	6E-04
Nickel	6.43E-05	2.0E-02	3E-03
Silver	3.14E-07	5.0E-03	6E-05
Zinc	3.36E-04	2.0E-01	2E-03
246TNT	5.92E-06	5.0E-04	1E-02
HMX	3.80E-06	5.0E-02	8E-05
RDX	2.44E-05	3.0E-03	8E-03
Total			6E+00 (a)

"--" - Not calculated because contaminant is not considered a carcinogen or potency factor is not available.

"**" - Reference dose is not available.

* - Replaces original Table 7-90 in the Final Baseline RA; Dames & Moore, 1992a.

(a) - Final Baseline RA results were a total potential carcinogenic risk of 2E-05 and a hazard index of 1E+01 (Dames & Moore, 1992a).

TABLE 7-91*

Potential Carcinogenic Risks and Noncarcinogenic Hazards Due to Inhalation of Dust at Site 17 Future Residential Land Use Scenario

Analyte	Carcinogenic Intake (mg/kg/day)	Slope Factor 1/(mg/kg/day)	Risk
Antimony	--	--	--
Beryllium	5.02E-10	8.4E+00	4E-09
Cadmium	7.83E-10	6.3E+00	5E-09
Cobalt	--	--	--
Copper	--	--	--
Iron	--	--	--
Lead	--	--	--
Mercury	--	--	--
Nickel	4.42E-09	1.7E+00	8E-09
Silver	--	--	--
Zinc	--	--	--
246TNT	4.06E-10	--	--
HMX	--	--	--
RDX	1.67E-09	--	--
Total			2E-08 (a)

Analyte	Noncarcinogenic Intake (mg/kg/day)	Reference Dose (mg/kg/day)	Hazard Quotient
Antimony	2.68E-08	**	**
Beryllium	1.17E-09	**	**
Cadmium	1.83E-09	**	**
Cobalt	9.25E-09	2.86E-04	3E-05
Copper	9.78E-08	**	**
Iron	2.61E-05	**	**
Lead	4.90E-07	**	**
Mercury	3.10E-11	9.00E-05	3E-07
Nickel	1.03E-08	**	**
Silver	5.04E-11	**	**
Zinc	5.38E-08	**	**
246TNT	9.48E-10	**	**
HMX	6.09E-10	**	**
RDX	3.91E-09	**	**
Total			3E-05 (a)

"--" - Not calculated because contaminant is not considered a carcinogen or potency factor is not available.

"**" - Reference dose is not available.

* - Replaces original Table 7-91 in the Final Baseline RA; Dames & Moore, 1992a.

(a) - Final Baseline RA results were a total potential carcinogenic risk of 3E-08 and a hazard index of 3E-05 (Dames & Moore, 1992a).

TABLE 7-92*

Potential Carcinogenic Risks and Noncarcinogenic Hazards Due to the Consumption of Crops at Site 17 Future Residential Land Use Scenario

Analyte	Carcinogenic Intake (mg/kg/day)	Slope Factor 1/(mg/kg/day)	Risk
Antimony	–	–	–
Beryllium	9.39E-07	4.3E+00	4E-06
Cadmium	–	–	–
Cobalt	–	–	–
Copper	–	–	–
Iron	–	–	–
Lead	–	–	–
Mercury	–	–	–
Nickel	–	–	–
Silver	–	–	–
Zinc	–	–	–
246TNT	2.06E-03	3.0E-02	6E-05
HMX	–	–	–
RDX	3.81E-02	1.1E-01	4E-03
Total			4E-03 (a)

Analyte	Noncarcinogenic Intake (mg/kg/day)	Reference Dose (mg/kg/day)	Hazard Quotient
Antimony	xx	4.0E-04	xx
Beryllium	2.19E-06	5.0E-03	4E-04
Cadmium	2.05E-04	1.0E-03	2E-01
Cobalt	xx	1.0E-05	xx
Copper	xx	3.7E-02	xx
Iron	xx	**	xx
Lead	4.59E-03	**	**
Mercury	5.23E-06	3.00E-04	2E-02
Nickel	9.64E-04	2.0E-02	5E-02
Silver	xx	5.0E-03	xx
Zinc	xx	2.0E-01	xx
246TNT	4.80E-03	5.0E-04	1E+01
HMX	3.12E-02	5.0E-02	6E-01
RDX	8.89E-02	3.0E-03	3E+01
Total			4E+01 (a)

"–" - Not calculated because contaminant is not considered a carcinogen or potency factor is not available.

"xx" - Quantitative information on uptake factors not available.

"**" - Reference dose is not available.

* - Replaces original Table 6-96 in the Final Baseline RA; Dames & Moore, 1992a.

(a) - Final Baseline RA results were a total potential carcinogenic risk of 8E-03 and a hazard index of 4E+01 (Dames & Moore, 1992a).

absorption of contaminants in soil, incidental soil ingestion, dust inhalation, and crop ingestion (pathways 1, 2, 3, and 12), respectively, for the future residential land use scenario at followup fieldwork Site 17.

The total potential carcinogenic risk and noncarcinogenic hazard for dermal absorption of contaminants in soil (pathway 1) are 9E-07 and 1E-01, respectively. These results are slightly lower than those calculated in the Baseline RA (2E-06 and 3E-01, respectively (Dames & Moore, 1992a)). As in the Baseline RA, the potential carcinogenic risk of 9E-07 is due to the presence of 2,4,6-TNT in site soil.

The total potential carcinogenic risk and noncarcinogenic hazard for inadvertent ingestion of contaminated soil (pathway 2) are 1E-05 and 6, respectively. These results are slightly lower than those calculated in the Baseline RA (2E-05 and 1E+01, respectively (Dames & Moore, 1992a)). As in the Baseline RA, the potential carcinogenic risk of 1E-05 is due mainly to the presence of beryllium. It should be noted that the background concentration of beryllium (1.86 mg/kg) results in a potential risk of 1E-05 for the soil ingestion pathway (see Appendix B in the Baseline RA); therefore, the potential carcinogenic risk is a result of naturally occurring background levels of beryllium. As in the Baseline RA, the potential noncarcinogenic hazard of 6 is due mainly to the presence of cobalt in Site 17 soil. The background concentration of cobalt (15 mg/kg) results in a potential hazard quotient of 5 for the soil ingestion pathway (see Appendix B in the Baseline RA); therefore, most of the potential hazard is a result of naturally occurring background levels of cobalt.

The total potential carcinogenic risk and noncarcinogenic hazard for inhalation of contaminated soil as airborne dust (pathway 3) are 2E-08 and 3E-05, respectively. These results are slightly lower than those calculated in the Baseline RA (3E-08 and 5E-05, respectively (Dames & Moore, 1992a)).

The total potential carcinogenic risk and noncarcinogenic hazard for consumption of crops irrigated by contaminated groundwater or grown in contaminated soil (pathway 12) are 4E-03 and 4E+01, respectively. These results are slightly lower than those calculated in the Baseline RA (8E-03 and 7E+01,

respectively (Dames & Moore, 1992a)). As in the Baseline RA, the potential carcinogenic risk of 4E-03 is due mainly to the presence of RDX. As in the Baseline RA, the potential noncarcinogenic hazard of 4E+01 is due mainly to the presence of 2,4,6-TNT and RDX.

Table 7-93* presents the multiple pathway potential carcinogenic risk and noncarcinogenic hazard for the future residential land use scenario at Site 17, which are 4E-03 and 5E+01, respectively. These results are slightly lower than those calculated in the Baseline RA (8E-03 and 8E+01, respectively (Dames & Moore, 1992a)). The crop ingestion pathway appears to present the greatest potential risk, while the soil and crop ingestion pathways appear to present the greatest potential hazard.

Table 7-94* presents the estimated carcinogenic intakes, noncarcinogenic intakes, potency factors, reference doses, potential risks, and potential hazards, as applicable, for inhalation of contaminated soil as airborne dust (pathway 3) for the future military (tank training) land use scenario at Site 17. The total potential carcinogenic risk and noncarcinogenic hazard for pathway 3 are 3E-08 and 5E-04, respectively. These results are slightly lower than those calculated in the Baseline RA (4E-08 and 7E-04, respectively (Dames & Moore, 1992a)).

7.3.2.7* Site 18: Dunnage Pits. Tables 7-95* and 7-96* present the estimated carcinogenic intakes, noncarcinogenic intakes, potency factors, reference doses, potential risks, and potential hazards, as applicable, for incidental soil ingestion and dust inhalation (pathways 2 and 3), respectively, for the future residential land use scenario at followup fieldwork Site 18.

The total potential carcinogenic risk and noncarcinogenic hazard for inadvertent ingestion of contaminated soil (pathway 2) are 1E-05 and 3E-01, respectively. These results are slightly lower than those calculated in the Baseline RA (2E-05 and 4E-01, respectively (Dames & Moore, 1992a)). As in the Baseline RA, the potential carcinogenic risk of 1E-05 is due to the presence of arsenic. It should be noted that the background concentration of arsenic (5.24 mg/kg) results in a potential risk of

TABLE 7-93*

Multiple Pathway Potential Carcinogenic Risks and Noncarcinogenic Hazards at Site 17 --Future Residential Land Use Scenario

Pathway No.	Pathway Description	Risk	Hazard Index
1	Dermal Absorption of Contaminants in Soil	9E-07	1E-01
2	Incidental Ingestion of Soil	1E-05	6E+00
3	Inhalation of Dust	2E-08	3E-05
5	Ingestion of Groundwater	NA	NA
6	Inhalation of Volatile Contaminants Emitted From Groundwater During Showering	NA	NA
7	Dermal Absorption of Groundwater Contaminants During Showering	NA	NA
12	Consumption of Crops	4E-03	4E+01
	Total	4E-03 (a)	5E+01 (a)

"NA" - Pathway not applicable to or quantified for site.

* - Replaces original Table 7-93 in the Final Baseline RA; Dames & Moore, 1992a.

(a) - Final Baseline RA results were a total potential carcinogenic risk of 8E-03 and a hazard index of 8E+01 (Dames & Moore, 1992a).

TABLE 7-94*

Potential Carcinogenic Risks and Noncarcinogenic Hazards Due to Inhalation of Dust at Site 17 Future Military Land Use Scenario

Analyte	Carcinogenic Intake (mg/kg/day)	Slope Factor 1/(mg/kg/day)	Risk	
Antimony	--	--	--	
Beryllium	7.75E-10	8.4E+00	7E-09	
Cadmium	1.21E-09	6.3E+00	8E-09	
Cobalt	--	--	--	
Copper	--	--	--	
Iron	--	--	--	
Lead	--	--	--	
Mercury	--	--	--	
Nickel	6.82E-09	1.7E+00	1E-08	
Silver	--	--	--	
Zinc	--	--	--	
246TNT	6.28E-10	--	--	
HMX	--	--	--	
RDX	2.58E-09	--	--	
Total			3E-08	(a)

Analyte	Noncarcinogenic Intake (mg/kg/day)	Reference Dose (mg/kg/day)	Hazard Quotient	
Antimony	4.13E-07	**	**	
Beryllium	1.81E-08	**	**	
Cadmium	2.82E-08	**	**	
Cobalt	1.43E-07	2.86E-04	5E-04	
Copper	1.51E-06	**	**	
Iron	4.03E-04	**	**	
Lead	7.57E-06	**	**	
Mercury	4.79E-10	9.0E-05	5E-06	
Nickel	1.59E-07	**	**	
Silver	7.78E-10	**	**	
Zinc	8.31E-07	**	**	
246TNT	1.46E-08	**	**	
HMX	9.40E-09	**	**	
RDX	6.03E-08	**	**	
Total			5E-04	(a)

"--" - Not calculated because contaminant is not considered a carcinogen or potency factor is not available.

"**" - Reference dose is not available.

* - Replaces original Table 7-94 in the Final Baseline RA; Dames & Moore, 1992a.

(a) - Final Baseline RA results were a total potential carcinogenic risk of 4E-08 and a hazard index of 7E-04 (Dames & Moore, 1992a).

TABLE 7-95*

Potential Carcinogenic Risks and Noncarcinogenic Hazards Due to Incidental Ingestion of Soil at Site 18 Future Residential Land Use Scenario

Analyte	Carcinogenic Intake (mg/kg/day)	Slope Factor 1/(mg/kg/day)	Risk
Aluminum	--	--	--
Arsenic	7.55E-06	1.75E+00	1E-05
Barium	--	--	--
Chromium	--	--	--
Copper	--	--	--
Lead	--	--	--
Manganese	--	--	--
Nickel	--	--	--
Silver	--	--	--
Sodium	--	--	--
Zinc	--	--	--
1,1,1-Trichloroethane	--	--	--
Di-n-butyl phthalate	--	--	--
Phenanthrene	--	--	--
DDE	9.39E-09	3.40E-01	3E-09
DDT	1.10E-08	3.40E-01	4E-09
Total			1E-05 (a)

Analyte	Noncarcinogenic Intake (mg/kg/day)	Reference Dose (mg/kg/day)	Hazard Quotient
Aluminum	6.61E-02	1.0E+00	7E-02
Arsenic	1.76E-05	3.0E-04	6E-02
Barium	1.13E-03	7.0E-02	2E-02
Chromium	1.64E-04	5.0E-03	3E-02
Copper	2.36E-04	3.7E-02	6E-03
Lead	9.13E-04	**	**
Manganese	3.82E-03	1.0E-01	4E-02
Nickel	7.27E-04	2.0E-02	4E-02
Silver	3.69E-06	5.0E-03	7E-04
Sodium	6.42E-03	**	**
Zinc	3.57E-03	2.0E-01	2E-02
1,1,1-Trichloroethane	2.56E-08	9.0E-02	3E-07
Di-n-butyl phthalate	5.37E-07	1.0E-01	5E-06
Phenanthrene	1.72E-07	**	**
DDE	2.19E-08	**	**
DDT	2.56E-08	5.00E-04	5E-05
Total			3E-01 (a)

"--" - Not calculated because contaminant is not considered a carcinogen or potency factor is not available.

"**" - Reference dose is not available.

* - Replaces original Table 7-95 in the Final Baseline RA; Dames & Moore, 1992a.

(a) - Final Baseline RA results were a total potential carcinogenic risk of 2E-05 and a hazard index of 4E-01 (Dames & Moore, 1992a).

TABLE 7-96*

Potential Carcinogenic Risks and Noncarcinogenic Hazards Due to Inhalation of Dust at Site 18 Future Residential Land Use Scenario

Analyte	Carcinogenic Intake (mg/kg/day)	Slope Factor 1/(mg/kg/day)	Risk	
Aluminum	--	--	--	
Arsenic	2.99E-09	1.4E+01	4E-08	
Barium	--	--	--	
Chromium	2.80E-08	4.2E+01	1E-06	
Copper	--	--	--	
Lead	--	--	--	
Manganese	--	--	--	
Nickel	1.24E-07	1.7E+00	2E-07	
Silver	--	--	--	
Sodium	--	--	--	
Zinc	--	--	--	
1,1,1-Trichloroethane	--	--	--	
Di-n-butyl phthalate	--	--	--	
Phenanthrene	--	--	--	
DDE	3.73E-12	--	--	
DDT	4.35E-12	3.4E-01	1E-12	
Total			1E-06	(a)

Analyte	Noncarcinogenic Intake (mg/kg/day)	Reference Dose (mg/kg/day)	Hazard Quotient	
Aluminum	2.62E-05	**	**	
Arsenic	6.99E-09	**	**	
Barium	4.48E-07	1.4E-04	3E-03	
Chromium	6.52E-08	6.0E-07	1E-01	
Copper	9.38E-08	**	**	
Lead	3.62E-07	**	**	
Manganese	1.52E-06	1.0E-04	2E-02	
Nickel	2.88E-07	**	**	
Silver	1.46E-09	**	**	
Sodium	2.55E-06	**	**	
Zinc	1.42E-06	**	**	
1,1,1-Trichloroethane	1.01E-11	3.0E-01	3E-11	
Di-n-butyl phthalate	2.13E-10	**	**	
Phenanthrene	6.81E-11	**	**	
DDE	8.70E-12	**	**	
DDT	1.01E-11	**	**	
Total			1E-01	(a)

"--" - Not calculated because contaminant is not considered a carcinogen or potency factor is not available.

"**" - Reference dose is not available.

* - Replaces original Table 7-97 in the Final Baseline RA; Dames & Moore, 1992a.

(a) - Final Baseline RA results were a total potential carcinogenic risk of 3E-06 and a hazard index of 2E-01 (Dames & Moore, 1992a).

1E-05 for the soil ingestion pathway (see Appendix B in the Baseline RA); therefore, the potential carcinogenic risk appears to be a result of naturally occurring background levels of arsenic.

The total potential carcinogenic risk and noncarcinogenic hazard for inhalation of contaminated soil as airborne dust (pathway 3) are 1E-06 and 1E-01, respectively. These results are slightly lower than those calculated in the Baseline RA (3E-06 and 2E-01, respectively (Dames & Moore, 1992a)). The potential carcinogenic risk of 1E-06 is due mainly to the presence of chromium. In the Baseline RA, nickel also contributed to the potential carcinogenic risk.

Table 7-97--which presents the carcinogenic intakes, noncarcinogenic intakes, potency factors, reference doses, potential risks, and potential hazards, as applicable, for groundwater ingestion (pathway 5) for the future residential land use scenario at Site 18--is not included in this addendum, because no additional groundwater sampling was conducted at this site during followup fieldwork.

Table 7-98* presents the estimated carcinogenic intakes, noncarcinogenic intakes, potency factors, reference doses, potential risks, and potential hazards, as applicable, for consumption of crops irrigated by contaminated groundwater or grown in contaminated soil (pathway 12) for the future residential land use scenario at Site 18. The total potential carcinogenic risk and noncarcinogenic hazard for pathway 12 are 2E-05 and 6E-01, respectively. These results are equal to or slightly lower than those calculated in the Baseline RA (2E-05 and 1E+00, respectively (Dames & Moore, 1992a)). As in the Baseline RA, the potential carcinogenic risk of 2E-05 is due to the presence of arsenic in site soil. As discussed above, the potential carcinogenic risk appears to be a result of naturally occurring background levels of arsenic.

Table 7-99* presents the multiple pathway potential carcinogenic risk and noncarcinogenic hazard for the future residential land use scenario at Site 18, which are 8E-04 and 5, respectively. These results are equal to or slightly lower than those calculated in the Baseline RA (8E-04 and 6E+00, respectively (Dames & Moore,

TABLE 7-98*

Potential Carcinogenic Risks and Noncarcinogenic Hazards Due to the Consumption of Crops at Site 18 Future Residential Land Use Scenario

Analyte	Carcinogenic Intake (mg/kg/day)	Slope Factor 1/(mg/kg/day)	Risk
Aluminum	--	--	--
Arsenic	9.13E-06	1.75E+00	2E-05
Barium	--	--	--
Chromium	--	--	--
Lead	--	--	--
Manganese	--	--	--
Nickel	--	--	--
Silver	--	--	--
Sodium	--	--	--
Vanadium	--	--	--
Zinc	--	--	--
1,1,1-Trichloroethane	--	--	--
Di-n-butyl phthalate	--	--	--
Phenanthrene	--	--	--
DDE	5.61E-08	3.4E-01	2E-08
DDT	2.68E-08	3.4E-01	9E-09
Total			2E-05 (a)

Analyte	Noncarcinogenic Intake (mg/kg/day)	Reference Dose (mg/kg/day)	Hazard Quotient
Aluminum	xx	1.0E+00	xx
Arsenic	2.13E-05	3.0E-04	7E-02
Barium	xx	7.0E-02	xx
Chromium	4.93E-05	5.0E-03	1E-02
Copper	xx	3.7E-02	xx
Lead	1.37E-03	**	**
Manganese	xx	1.0E-01	xx
Nickel	1.09E-02	2.0E-02	5E-01
Silver	xx	5.0E-03	xx
Sodium	xx	**	xx
Vanadium	xx	7.0E-03	xx
Zinc	xx	2.0E-01	xx
1,1,1-Trichloroethane	1.08E-05	9.0E-02	1E-04
Di-n-butyl phthalate	3.62E-06	1.0E-01	4E-05
Phenanthrene	5.27E-06	**	**
DDE	1.31E-07	**	**
DDT	6.26E-08	5.0E-04	1E-04
Total			6E-01 (a)

"--" - Not calculated because contaminant is not considered a carcinogen or potency factor is not available.

"xx" - Quantitative information on uptake factors not available.

"**" - Reference dose is not available.

* - Replaces original Table 7-98 in the Final Baseline RA; Dames & Moore, 1992a.

(a) - Final Baseline RA results were a total potential carcinogenic risk of 2E-05 and a hazard index of 1E+00 (Dames & Moore, 1992a).

TABLE 7-99*

Multiple Pathway Potential Carcinogenic Risks and Noncarcinogenic Hazards at Site 18 --Future Residential Land Use Scenario

Pathway No.	Pathway Description	Risk		Hazard Index	
1	Dermal Absorption of Contaminants in Soil	NA		NA	
2	Incidental Ingestion of Soil	1E-05		3E-01	
3	Inhalation of Dust	1E-06		1E-01	
5	Ingestion of Groundwater	8E-04		4E+00	
6	Inhalation of Volatile Contaminants Emitted From Groundwater During Showering	NA		NA	
7	Dermal Absorption of Groundwater Contaminants During Showering	NA		NA	
12	Consumption of Crops	2E-05		6E-01	
	Total	8E-04	(a)	5E+00	(a)

"NA" - Pathway not applicable to or quantified for site.

* - Replaces original Table 7-99 in the Final Baseline RA; Dames & Moore, 1992a.

(a) - Final Baseline RA results were a total potential carcinogenic risk of 8E-04 and a hazard index of 5E+00 (Dames & Moore, 1992a).

1992a)). The groundwater ingestion pathway appears to present the greatest potential risk and hazard.

Table 7-100* presents the estimated carcinogenic intakes, noncarcinogenic intakes, potency factors, reference doses, potential risks, and potential hazards, as applicable, for inhalation of contaminated soil as airborne dust (pathway 3) for the future military (tank training) land use scenario at Site 18. The total potential carcinogenic risk and noncarcinogenic hazard for the dust inhalation pathway are 3E-06 and 3, respectively, which are due mainly to the presence of chromium in site soil. These results are slightly lower than those calculated in the Baseline RA (6E-06 and 5, respectively (Dames & Moore, 1992a)).

7.3.2.8* <u>Site 19: Open Burning Trenches/Pads</u>. Tables 7-101* through 7-103* present the estimated carcinogenic intakes, noncarcinogenic intakes, potency factors, reference doses, potential risks, and potential hazards, as applicable, for dermal absorption of contaminants in soil, incidental soil ingestion, and dust inhalation (pathways, 1, 2, and 3), respectively, for the future residential land use scenario at followup fieldwork Site 19.

The total potential carcinogenic risk and noncarcinogenic hazard for dermal absorption of contaminants in soil (pathway 1) are 6E-03 and 9E+02, respectively, due to the presence of 2,4,6-TNT. These results are slightly lower than those calculated in the Baseline RA (2E-02 and 3E+03, respectively (Dames & Moore, 1992a)).

The total potential carcinogenic risk and noncarcinogenic hazard for inadvertent ingestion of contaminated soil (pathway 2) are 7E-04 and 9E+01, respectively. These results are slightly lower than those calculated in the Baseline RA (2E-03 and 3E+02, respectively (Dames & Moore, 1992a)). As in the Baseline RA, the potential carcinogenic risk of 7E-04 is due to the presence of arsenic and 2,4,6-TNT. As in the Baseline RA, the potential noncarcinogenic hazard of 9E+01 is due mainly to the presence of 2,4,6-TNT, 1,3,5-TNB, zinc, antimony, and copper in site soil.

The total potential carcinogenic risk and noncarcinogenic hazard for inhalation of contaminated soil as airborne dust (pathway 3) are 2E-06 and 1E-01, respectively.

TABLE 7-100*

Potential Carcinogenic Risks and Noncarcinogenic Hazards Due to Inhalation of Dust at Site 18 Future Military Land Use Scenario

Analyte	Carcinogenic Intake (mg/kg/day)	Slope Factor 1/(mg/kg/day)	Risk	
Aluminum	--	--	--	
Arsenic	6.98E-09	1.4E+01	1E-07	
Barium	--	--	--	
Chromium	6.52E-08	4.2E+01	3E-06	
Copper	--	--	--	
Lead	--	--	--	
Manganese	--	--	--	
Nickel	2.88E-07	1.7E+00	5E-07	
Silver	--	--	--	
Sodium	--	--	--	
Zinc	--	--	--	
1,1,1-Trichloroethane	--	--	--	
Di-n-butyl phthalate	--	--	--	
Phenanthrene	--	--	--	
DDE	--	--	--	
DDT	1.01E-11	3.4E-01	3E-12	
Total			3E-06	(a)

Analyte	Noncarcinogenic Intake (mg/kg/day)	Reference Dose (mg/kg/day)	Hazard Quotient	
Aluminum	6.11E-04	**	**	
Arsenic	1.63E-07	**	**	
Barium	1.04E-05	1.4E-04	7E-02	
Chromium	1.52E-06	6.0E-07	3E+00	
Copper	2.19E-06	**	**	
Lead	8.45E-06	**	**	
Manganese	3.54E-05	1.0E-04	4E-01	
Nickel	6.72E-06	**	**	
Silver	3.41E-08	**	**	
Sodium	5.94E-05	**	**	
Zinc	3.30E-05	**	**	
1,1,1-Trichloroethane	2.37E-10	3.0E-01	8E-10	
Di-n-butyl phthalate	4.97E-09	**	**	
Phenanthrene	1.59E-09	**	**	
DDE	2.03E-10	**	**	
DDT	2.37E-10	**	**	
Total			3E+00	(a)

"--" - Not calculated because contaminant is not considered a carcinogen or potency factor is not available.

"**" - Reference dose is not available.

* - Replaces original Table 7-100 in the Final Baseline RA; Dames & Moore, 1992a.

(a) - Final Baseline RA results were a total potential carcinogenic risk of 6E-06 and a hazard index of 5E+00 (Dames & Moore, 1992a).

TABLE 7-101*

Potential Carcinogenic Risks and Noncarcinogenic Hazards Due to Dermal Absorption of Contaminants in Soil at Site 19 Future Residential Land Use Scenario

Analyte	Carcinogenic Intake (mg/kg/day)	Slope Factor 1/(mg/kg/day)	Risk	
135TNB	--	--	--	
246TNT	1.88E-01	3.0E-02	6E-03	
Nitrobenzene	--	--	--	
Tetryl	--	--	--	
Total			6E-03	(a)

Analyte	Noncarcinogenic Intake (mg/kg/day)	Reference Dose (mg/kg/day)	Hazard Quotient	
135TNB	1.74E-03	5.0E-05	3E+01	
246TNT	4.39E-01	5.0E-04	9E+02	
Nitrobenzene	1.42E-04	5.0E-04	3E-01	
Tetryl	6.49E-05	1.0E-02	6E-03	
Total			9E+02	(a)

"--" - Not calculated because contaminant is not considered a carcinogen or potency factor is not available.

* - Replaces original Table 7-101 in the Final Baseline RA; Dames & Moore, 1992a.

(a) - Final Baseline RA results were a total potential carcinogenic risk of 2E-02 and a hazard index of 3E+03 (Dames & Moore, 1992a).

TABLE 7-102*

Potential Carcinogenic Risks and Noncarcinogenic Hazards Due to Incidental Ingestion of Soil at Site 19 Future Residential Land Use Scenario

Analyte	Carcinogenic Intake (mg/kg/day)	Slope Factor 1/(mg/kg/day)	Risk
Aluminum	–	–	–
Antimony	–	–	–
Arsenic	1.10E-04	1.75E+00	2E-04
Barium	–	–	–
Cadmium	–	–	–
Chromium	–	–	–
Copper	–	–	–
Lead	–	–	–
Mercury	–	–	–
Nickel	–	–	–
Potassium	–	–	–
Silver	–	–	–
Sodium	–	–	–
Zinc	–	–	–
135TNB	–	–	–
246TNT	1.57E-02	3.0E-02	5E-04
Nitrobenzene	–	–	–
Tetryl	–	–	–
Nitrite/nitrate	–	–	–
Total			7E-04 (a)

Analyte	Noncarcinogenic Intake (mg/kg/day)	Reference Dose (mg/kg/day)	Hazard Quotient
Aluminum	4.62E-02	1.0E+00	5E-02
Antimony	3.25E-03	4.0E-04	8E+00
Arsenic	2.56E-04	3.0E-04	9E-01
Barium	2.96E-02	7.0E-02	4E-01
Cadmium	6.68E-04	1.0E-03	7E-01
Chromium	8.04E-05	5.0E-03	2E-02
Copper	1.16E-01	3.7E-02	3E+00
Lead	4.47E-03	**	**
Mercury	3.25E-06	3.0E-04	1E-02
Nickel	8.58E-05	2.0E-02	4E-03
Potassium	9.69E-03	**	**
Silver	5.00E-06	5.0E-03	1E-03
Sodium	2.64E-03	**	**
Zinc	2.21E-01	2.0E-01	1E+00
135TNB	1.45E-04	5.0E-05	3E+00
246TNT	3.66E-02	5.0E-04	7E+01
Nitrobenzene	1.18E-05	5.0E-04	2E-02
Tetryl	5.41E-06	1.0E-02	5E-04
Nitrite/nitrate	4.09E-05	1.6E+00	3E-05
Total			9E+01 (a)

"–" - Not calculated because contaminant is not considered a carcinogen or potency factor is not available.

"**" - Reference dose is not available.

* - Replaces original Table 7-102 in the Final Baseline RA; Dames & Moore, 1992a.

(a) - Final Baseline RA results were a total potential carcinogenic risk of 2E-03 and a hazard index of 3E+02 (Dames & Moore, 1992a).

TABLE 7-103*

Potential Carcinogenic Risks and Noncarcinogenic Hazards Due to Inhalation of Dust at Site 19 Future Residential Land Use Scenario

Analyte	Carcinogenic Intake (mg/kg/day)	Slope Factor 1/(mg/kg/day)	Risk
Aluminum	--	--	--
Antimony	--	--	--
Arsenic	3.86E-08	1.4E+01	5E-07
Barium	--	--	--
Cadmium	1.01E-07	6.3E+00	6E-07
Chromium	1.21E-08	4.2E+01	5E-07
Copper	--	--	--
Lead	--	--	--
Mercury	--	--	--
Nickel	1.29E-08	1.7E+00	2E-08
Potassium	--	--	--
Silver	--	--	--
Sodium	--	--	--
Zinc	--	--	--
135TNB	--	--	--
246TNT	5.51E-06	--	--
Nitrobenzene	--	--	--
Tetryl	--	--	--
Nitrite/nitrate	--	--	--
Total			2E-06 (a)

Analyte	Noncarcinogenic Intake (mg/kg/day)	Reference Dose (mg/kg/day)	Hazard Quotient
Aluminum	1.62E-05	**	**
Antimony	1.14E-06	**	**
Arsenic	9.00E-08	**	**
Barium	1.04E-05	1.4E-04	7E-02
Cadmium	2.35E-07	**	**
Chromium	2.82E-08	6.0E-07	5E-02
Copper	4.06E-05	**	**
Lead	1.57E-06	**	**
Mercury	1.14E-09	9.0E-05	1E-05
Nickel	3.01E-08	**	**
Potassium	3.40E-06	**	**
Silver	1.76E-09	**	**
Sodium	9.26E-07	**	**
Zinc	7.74E-05	**	**
135TNB	5.10E-08	**	**
246TNT	1.28E-05	**	**
Nitrobenzene	4.14E-09	6.0E-04	7E-06
Tetryl	1.90E-09	**	**
Nitrite/nitrate	1.44E-08	**	**
Total			1E-01 (a)

"--" - Not calculated because contaminant is not considered a carcinogen or potency factor is not available.

"**" - Reference dose is not available.

* - Replaces original Table 7-103 in the Final Baseline RA; Dames & Moore, 1992a.

(a) - Final Baseline RA results were a total potential carcinogenic risk of 5E-06 and a hazard index of 3E-01 (Dames & Moore, 1992a).

These results are slightly lower than those calculated in the Baseline RA (5E-06 and 3E-01, respectively (Dames & Moore, 1992a)). As in the Baseline RA, the potential carcinogenic risk of 2E-06 is due mainly to the presence of arsenic, cadmium, and chromium in soil.

Tables 7-104* and 7-105* present the estimated carcinogenic intakes, noncarcinogenic intakes, potency factors, reference doses, potential risks, and potential hazards, as applicable, for groundwater ingestion and dermal absorption of contaminants in groundwater (pathways 5 and 7), respectively, for the future residential land use scenario at Site 19.

The total potential carcinogenic risk and noncarcinogenic hazard for ingestion of contaminated drinking water (pathway 5) are 4E-04 and 4, respectively. These results are unchanged from those calculated in the Baseline RA (Dames & Moore, 1992a). The potential carcinogenic risk of 4E-04 is due to the presence of arsenic and beryllium in site groundwater. The potential noncarcinogenic hazard of 4 is due mainly to the presence of antimony and arsenic. Chronic oral exposure to arsenic may cause vascular and skin lesions, gastrointestinal irritation, anemia, and other dermal and vascular effects. Adverse health effects related to antimony include decreased lifespan, altered cholesterol levels, decreased glucose levels, and decreased heart weight. Based on this evaluation, the hazard index of 4 may be an overestimate, because adverse health effects differ for arsenic and antimony. Therefore, it may be more appropriate to consider each hazard quotient separately.

A total potential carcinogenic risk for dermal absorption of contaminants in groundwater during showering (pathway 7) is not calculated, because a potency factor for 1,3-DNB is not available. The total potential noncarcinogenic hazard is 4E-04, slightly lower than that of 5E-04 calculated in the Baseline RA (Dames & Moore, 1992a).

Table 7-106* presents the estimated carcinogenic intakes, noncarcinogenic intakes, potency factors, reference doses, potential risks, and potential hazards, as applicable, for consumption of crops irrigated by contaminated groundwater or grown

TABLE 7-104*

Potential Carcinogenic Risks and Noncarcinogenic Hazards Due to Ingestion of Groundwater at Site 19 Future Residential Land Use Scenario

Analyte	Carcinogenic Intake (mg/kg/day)	Slope Factor 1/(mg/kg/day)	Risk	
Antimony	--	--	--	
Arsenic	2.14E-04	1.75E+00	4E-04	
Beryllium	5.87E-06	4.30E+00	3E-05	
Copper	--	--	--	
Lead	--	--	--	
Nickel	--	--	--	
Selenium	--	--	--	
Vanadium	--	--	--	
13DNB	--	--	--	
Total			4E-04	(a)

Analyte	Noncarcinogenic Intake (mg/kg/day)	Reference Dose (mg/kg/day)	Hazard Quotient	
Antimony	5.04E-04	4.0E-04	1E+00	
Arsenic	4.99E-04	3.0E-04	2E+00	
Beryllium	1.37E-05	5.0E-03	3E-03	
Copper	9.10E-05	3.7E-02	2E-03	
Lead	2.61E-04	**	**	
Nickel	4.85E-04	2.0E-02	2E-02	
Selenium	8.16E-04	5.0E-03	2E-01	
Vanadium	2.45E-03	7.0E-03	4E-01	
13DNB	1.14E-05	1.0E-04	1E-01	
Total			4E+00	(a)

"--" Not calculated because contaminant is not considered a carcinogen or potency factor is not available.

"**" - Reference dose not available.

* - Replaces original Table 7-103 in the Final Baseline RA; Dames & Moore, 1992a.

(a) - Unchanged

TABLE 7-105*

Potential Carcinogenic Risks and Noncarcinogenic Hazards Due to Dermal Absorption of Groundwater Contaminants at Site 19 Future Residential Land Use Scenario

Analyte	Carcinogenic Intake (mg/kg/day)	Slope Factor 1/(mg/kg/day)	Risk	
13DNB	--	--	--	
Total			0E+00	(a)

Analyte	Noncarcinogenic Intake (mg/kg/day)	Reference Dose (mg/kg/day)	Hazard Quotient	
13DNB	4.06E-08	1.0E-04	4E-04	
Total			4E-04	(a)

"--" - Not calculated because contaminant is not considered a carcinogen or potency factor is not available.

* - Replaces original Table 7-105 in the Final Baseline RA; Dames & Moore, 1992a.

(a) - Final Baseline RA results were a total potential carcinogenic risk of 0E+00 and a hazard index of 5E-04 (Dames & Moore, 1992a).

TABLE 7-106*

Potential Carcinogenic Risks and Noncarcinogenic Hazards Due to the Consumption of Crops at Site 19 Future Residential Land Use Scenario

Analyte	Carcinogenic Intake (mg/kg/day)	Slope Factor 1/(mg/kg/day)	Risk (a)
Aluminum	--	--	--
Antimony	--	--	--
Arsenic	1.32E-04	1.75E+00	2E-04
Barium	--	--	--
Beryllium	4.75E-07	4.30E+00	2E-06
Cadmium	--	--	--
Chromium	--	--	--
Copper	--	--	--
Lead	--	--	--
Manganese	--	--	--
Mercury	--	--	--
Nickel	--	--	--
Potassium	--	--	--
Selenium	--	--	--
Silver	--	--	--
Sodium	--	--	--
Vanadium	--	--	--
Zinc	--	--	--
135TNB	--	--	--
246TNT	1.27E+01	3.0E-02	3E-01
13DNB	--	--	--
Nitrobenzene	--	--	--
Tetryl	--	--	--
Nitrite/nitrate	--	--	--
Total			3E-01 (b)

Analyte	Noncarcinogenic Intake (mg/kg/day)	Reference Dose (mg/kg/day)	Hazard Quotient
Aluminum	xx	1.0E+00	xx
Antimony	xx	4.0E-04	xx
Arsenic	3.08E-04	3.0E-04	1E+00
Barium	xx	7.0E-02	xx
Beryllium	1.11E-06	5.0E-03	2E-04
Cadmium	1.20E-02	1.0E-03	1E+01
Chromium	2.41E-05	5.0E-03	5E-03
Copper	xx	3.7E-02	xx
Lead	6.71E-03	**	**
Manganese	xx	1.0E-01	xx
Mercury	8.77E-05	3.0E-04	3E-01
Nickel	1.29E-03	2.0E-02	6E-02
Potassium	xx	**	xx
Selenium	xx	5.0E-03	xx
Silver	xx	5.0E-03	xx
Sodium	xx	**	xx
Vanadium	xx	7.0E-03	xx
Zinc	xx	2.0E-01	xx
135TNB	3.51E-01	5.0E-05	7E+03
246TNT	2.97E+01	5.0E-04	6E+04
13DNB	1.53E-06	1.0E-04	2E-02
Nitrobenzene	1.17E-02	5.0E-04	2E+01
Tetryl	6.99E-03	1.0E-02	7E-01
Nitrite/nitrate	xx	1.6E+00	xx
Total			7E+04 (b)

(a) - Since chemical intakes for this pathway are expected to be high, the one-hit equation is used to estimate carcinogenic risks instead of the linear low-dose cancer risk equation (EPA, 1989b).

(b) - Final Baseline RA results were a total potential carcinogenic risk of 7E-01 and a hazard index of 2E+05 (Dames & Moore, 1992a).

"--" - Not calculated because contaminant is not considered a carcinogen or potency factor is not available.

"xx" - Quantitative information on uptake factors not available.

"**" - Reference dose is not available.

* - Replaces original Table 7-106 in the Final Baseline RA; Dames & Moore, 1992a.

in contaminated soil (pathway 12) for the future residential land use scenario at Site 19. The total potential carcinogenic risk and noncarcinogenic hazard for pathway 12 are 3E-01 and 7E+04, respectively. These results are slightly lower than those calculated in the Baseline RA (2E-01 and 2E+05, respectively (Dames & Moore, 1992a)). Because potential carcinogenic risks for this pathway are high (i.e., greater than 1E-02) using the linear low-dose cancer risk equation, the one-hit equation (see Section 7.1 of the Baseline RA) is used to estimate carcinogenic risks. As in the Baseline RA, the potential carcinogenic risk of 3E-01 is due to the presence of 2,4,6-TNT in soil. As in the Baseline RA, the potential noncarcinogenic hazard of 7E+04 is due mainly to the presence of 2,4,6-TNT and 1,3,5-TNB in soil.

Table 7-107* presents the multiple pathway potential carcinogenic risk and noncarcinogenic hazard for the future residential land use scenario at Site 19. The total potential carcinogenic risk and noncarcinogenic hazard are 3E-01 and 7E+04, respectively. These results are slightly lower than those calculated in the Baseline RA (7E-01 and 2E+05, respectively (Dames & Moore, 1992a)). As in the Baseline RA, the crop ingestion pathway presents the greatest potential risk and hazard.

Table 7-108* presents the estimated carcinogenic intakes, noncarcinogenic intakes, potency factors, reference doses, potential risks, and potential hazards, as applicable, for inhalation of contaminated soil as airborne dust (pathway 3) for the future military (tank training) land use scenario at Site 19. The total potential carcinogenic risk and noncarcinogenic hazard for this pathway are 1E-05 and 8, respectively. These results are slightly lower than those calculated in the Baseline RA (3E-05 and 2E+01, respectively (Dames & Moore, 1992a)). As in the Baseline RA, the potential carcinogenic risk of 1E-05 is due mainly to the presence of arsenic, chromium, and cadmium. As in the Baseline RA, the noncarcinogenic hazard of 8 is due mainly to the presence of barium and chromium.

7.3.3* Operable Unit C: Inactive Landfills

7.3.3.1* Site 12: Inactive Landfill. Tables 7-202A, 7-202B, and 7-203* present the estimated carcinogenic intakes, noncarcinogenic intakes, potency factors, reference

TABLE 7-107*

Multiple Pathway Potential Carcinogenic Risks and Noncarcinogenic Hazards at Site 19 --Future Residential Land Use Scenario

Pathway No.	Pathway Description	Risk		Hazard Index	
1	Dermal Absorption of Contaminants in Soil	6E-03		9E+02	
2	Incidental Ingestion of Soil	7E-04		9E+01	
3	Inhalation of Dust	2E-06		1E-01	
5	Ingestion of Groundwater	4E-04		4E+00	
6	Inhalation of Volatile Contaminants Emitted From Groundwater During Showering	NA		NA	
7	Dermal Absorption of Groundwater Contaminants During Showering	0E+00		4E-04	
12	Consumption of Crops	3E-01		7E+04	
	Total	3E-01	(a)	7E+04	(a)

"NA" - Pathway not applicable to or quantified for site.

* - Replaces original Table 7-107 in the Final Baseline RA; Dames & Moore, 1992a.

(a) - Final Baseline RA results were a total potential carcinogenic risk of 7E-01 and a hazard index of 2E+05 (Dames & Moore, 1992a).

TABLE 7-108*

Potential Carcinogenic Risks and Noncarcinogenic Hazards Due to Inhalation of Dust at Site 19 Future Military Land Use Scenario

Analyte	Carcinogenic Intake (mg/kg/day)	Slope Factor 1/(mg/kg/day)	Risk
Aluminum	--	--	--
Antimony	--	--	--
Arsenic	2.39E-07	1.4E+01	3E-06
Barium	--	--	--
Cadmium	6.23E-07	6.3E+00	4E-06
Chromium	7.49E-08	4.2E+01	3E-06
Copper	--	--	--
Lead	--	--	--
Mercury	--	--	--
Nickel	8.00E-08	1.7E+00	1E-07
Potassium	--	--	--
Silver	--	--	--
Sodium	--	--	--
Zinc	--	--	--
135TNB	--	--	--
246TNT	3.41E-05	--	--
Nitrobenzene	--	--	--
Tetryl	--	--	--
Nitrite/nitrate	--	--	--
Total			1E-05 (a)

Analyte	Noncarcinogenic Intake (mg/kg/day)	Reference Dose (mg/kg/day)	Hazard Quotient
Aluminum	1.00E-03	**	**
Antimony	7.07E-05	**	**
Arsenic	5.58E-06	**	**
Barium	6.44E-04	1.4E-04	5E+00
Cadmium	1.45E-05	**	**
Chromium	1.75E-06	6.0E-07	3E+00
Copper	2.52E-03	**	**
Lead	9.73E-05	**	**
Mercury	7.06E-08	9.0E-05	8E-04
Nickel	1.87E-06	**	**
Potassium	2.11E-04	**	**
Silver	1.09E-07	**	**
Sodium	5.74E-05	**	**
Zinc	4.80E-03	**	**
135TNB	3.16E-06	**	**
246TNT	7.96E-04	**	**
Nitrobenzene	2.57E-07	6.0E-04	4E-04
Tetryl	1.18E-07	**	**
Nitrite/nitrate	8.90E-07	**	**
Total			8E+00 (a)

"--" - Not calculated because contaminant is not considered a carcinogen or potency factor is not available.

"**" - Reference dose is not available.

* - Replaces original Table 7-108 in the Final Baseline RA; Dames & Moore, 1992a.

(a) - Final Baseline RA results were a total potential carcinogenic risk of 3E-05 and a hazard index of 2E+01 (Dames & Moore, 1992a).

TABLE 7-202A

Potential Carcinogenic Risks and Noncarcinogenic Hazards Due to Incidental Ingestion of Soil at Site 12 Future Residential Land Use Scenario

Analyte	Carcinogenic Intake (mg/kg/day)	Slope Factor 1/(mg/kg/day)	Risk	
Lead	--	--	--	
Silver	--	--	--	
Zinc	--	--	--	
Benzo(k)fluoranthene	1.27E-07	5.8E+00	7E-07	
Chrysene	2.90E-07	5.8E+00	2E-06	
Fluoranthene	--	--	--	
Phenanthrene	--	--	--	
Pyrene	--	--	--	
DDE	2.21E-07	3.4E-01	8E-08	
DDT	9.55E-08	3.4E-01	3E-08	
Total			3E-06	(a)

Analyte	Noncarcinogenic Intake (mg/kg/day)	Reference Dose (mg/kg/day)	Hazard Quotient	
Lead	9.53E-05	**	**	
Silver	2.34E-07	5.0E-03	5E-05	
Zinc	4.97E-04	2.0E-01	2E-03	
Benzo(k)fluoranthene	2.96E-07	**	**	
Chrysene	6.76E-07	**	**	
Fluoranthene	4.57E-07	4.0E-02	1E-05	
Phenanthrene	3.54E-07	**	**	
Pyrene	9.35E-07	3.0E-02	3E-05	
DDE	5.15E-07	**	**	
DDT	2.23E-07	5.0E-04	4E-04	
Total			3E-03	(a)

"--" - Not calculated because contaminant is not considered a carcinogen or potency factor is not available.

"**" - Reference dose is not available.

(a) - Because no surface soil sampling was previously performed, no Baseline RA results are available.

TABLE 7-202B

Potential Carcinogenic Risks and Noncarcinogenic Hazards Due to Inhalation of Dust at Site 12 Future Residential Land Use Scenario

Analyte	Carcinogenic Intake (mg/kg/day)	Slope Factor 1/(mg/kg/day)	Risk	
Lead	--	--	--	
Silver	--	--	--	
Zinc	--	--	--	
Benzo(k)fluoranthene	2.55E-11	6.1E+00	2E-10	
Chrysene	5.82E-11	6.1E+00	4E-10	
Fluoranthene	--	--	--	
Phenanthrene	--	--	--	
Pyrene	--	--	--	
DDE	4.44E-11	--	--	
DDT	1.92E-11	3.4E-01	7E-12	
Total			5E-10	(a)

Analyte	Noncarcinogenic Intake (mg/kg/day)	Reference Dose (mg/kg/day)	Hazard Quotient	
Lead	1.92E-08	**	**	
Silver	4.70E-11	**	**	
Zinc	9.99E-08	**	**	
Benzo(k)fluoranthene	5.95E-11	**	**	
Chrysene	1.36E-10	**	**	
Fluoranthene	9.18E-11	**	**	
Phenanthrene	7.12E-11	**	**	
Pyrene	1.88E-10	**	**	
DDE	1.04E-10	**	**	
DDT	4.48E-11	**	**	
Total			0E+00	(a)

"--" - Not calculated because contaminant is not considered a carcinogen or potency factor is not available.

"**" - Reference dose is not available.

(a) - Because no surface soil sampling was previously performed, no baseline RA results are available.

TABLE 7-203*

Potential Carcinogenic Risks and Noncarcinogenic Hazards Due to the Consumption of Crops at Site 12 Future Residential Land Use Scenario

Analyte	Carcinogenic Intake (mg/kg/day)	Slope Factor 1/(mg/kg/day)	Risk	
Antimony	--	--	--	
Arsenic	3.69E-06	1.75E+00	6E-06	
Copper	--	--	--	
Lead	--	--	--	
Nickel	--	--	--	
Silver	--	--	--	
Vanadium	--	--	--	
Zinc	--	--	--	
Cyanide	--	--	--	
RDX	2.05E-06	1.1E-01	2E-07	
Tetryl	--	--	--	
Benzo(k)fluoranthene	1.64E-07	5.8E+00	1E-06	
Chrysene	1.92E-06	5.8E+00	1E-05	
Fluoranthene	--	--	--	
Phenanthrene	--	--	--	
Pyrene	--	--	--	
DDE	1.32E-06	3.4E-01	4E-07	
DDT	2.34E-07	3.4E-01	8E-08	
Total			2E-05	(a)

Analyte	Noncarcinogenic Intake (mg/kg/day)	Reference Dose (mg/kg/day)	Hazard Quotient	
Antimony	xx	4.0E-04	xx	
Arsenic	8.61E-06	3.0E-04	3E-02	
Copper	xx	3.7E-02	xx	
Lead	1.43E-04	**	**	
Nickel	5.30E-04	2.0E-02	3E-02	
Silver	xx	5.0E-03	xx	
Vanadium	xx	7.0E-03	xx	
Zinc	xx	2.0E-01	xx	
Cyanide	xx	2.0E-02	xx	
RDX	4.77E-06	3.0E-03	2E-03	
Tetryl	1.35E-06	1.0E-02	1E-04	
Benzo(k)fluoranthene	3.83E-07	**	**	
Chrysene	4.47E-06	**	**	
Fluoranthene	4.40E-06	4.0E-02	1E-04	
Phenanthrene	1.09E-05	**	**	
Pyrene	1.59E-05	3.0E-02	5E-04	
DDE	3.08E-06	**	**	
DDT	5.46E-07	5.0E-04	1E-03	
Total			6E-02	(a)

"--" - Not calculated because contaminant is not considered a carcinogen or potency factor is not available.

"xx" - Quantitative information on uptake factors not available.

"**" - Reference dose not available.

* - Replaces original Table 7-203 in the Final Baseline RA; Dames & Moore, 1992a.

(a) - Final Baseline RA results were a total potential carcinogenic risk of 2E-07 and a hazard index of 2E-03 (Dames & Moore, 1992a).

doses, potential risks, and potential hazards, as applicable, for incidental soil ingestion, dust inhalation, and crop ingestion (pathways 2, 3, and 12), respectively, for the future residential land use scenario at follow fieldwork Site 12.

Tables 7-201 and 7-202 of the Baseline RA--which present the carcinogenic intakes, noncarcinogenic intakes, potency factors, reference doses, potential risks, and potential hazards for the ingestion of contaminated drinking water (pathway 5) and dermal absorption of contaminants in groundwater (pathway 7) for the future residential land use scenario at Site 12--are not included in this addendum, because no additional groundwater sampling was conducted at this site during the followup field investigation.

The total potential carcinogenic risk and noncarcinogenic hazard for inadvertent ingestion of contaminated soil (pathway 2) are 3E-06 and 3E-03, respectively. The potential carcinogenic risk of 3E-06 is due mainly to the presence of chrysene and benzo(k)fluoranthene. Because soil sampling was not previously performed, no Baseline RA results are available for this pathway.

The total potential carcinogenic risk for inhalation of contaminated soil as airborne dust (pathway 3) is 5E-10. A noncarcinogenic hazard is not calculated, because inhalation reference doses are not available for the contaminants of concern. Because soil sampling was not previously performed, no Baseline RA results are available for this pathway.

As shown in Table 7-203*, the total potential carcinogenic risk and noncarcinogenic hazard for consumption of crops irrigated by contaminated groundwater or grown in contaminated soil (pathway 12) are 2E-05 and 6E-02, respectively. These results are higher than those calculated in the Baseline RA (2E-07 and 2E-03, respectively), which were based on groundwater contamination alone (Dames & Moore, 1992a). The potential carcinogenic risk of 2E-05 is due mainly to the presence of chrysene and benzo(k)fluoranthene in soil.

Table 7-204* presents the multiple pathway potential carcinogenic risk and noncarcinogenic hazard for the future residential land use scenario at Site 12, which

TABLE 7-204*

Multiple Pathway Potential Carcinogenic Risks and Noncarcinogenic Hazards at Site 12 --Future Residential Land Use Scenario

Pathway No.	Pathway Description	Risk	Hazard Index
1	Dermal Absorption of Contaminants in Soil	NA	NA
2	Incidental Ingestion of Soil	3E-06	3E-03
3	Inhalation of Dust	5E-10	0E+00
5	Ingestion of Groundwater	1E-04	9E-01
6	Inhalation of Volatile Contaminants Emitted From Groundwater During Showering	NA	NA
7	Dermal Absorption of Groundwater Contaminants During Showering	9E-10	7E-06
12	Consumption of Crops	2E-05	6E-02
	Total	1E-04 (a)	1E+00 (a)

"NA" - Pathway not applicable to or quantified for site.

* - Replaces original Table 7-204 in the Final Baseline RA; Dames & Moore, 1992a.

(a) - Final Baseline RA results were a total potential carcinogenic risk of 1E-04 and a hazard index of 9E-01 (Dames & Moore, 1992a).

are 1E-04 and 1E-00, respectively. These results are equal to or slightly higher than those calculated in the Baseline RA (1E-04 and 9E-01, respectively (Dames & Moore, 1992a)). The groundwater ingestion pathway appears to present the greatest potential risk and hazard.

7.3.3.2* Site 50: Railroad Landfill Area. Tables 7-205* through 7-207* present the estimated carcinogenic intakes, noncarcinogenic intakes, potency factors, reference doses, potential risks, and potential hazards, as applicable, for ingestion of contaminated drinking water, dermal absorption of contaminants in groundwater, and crop ingestion (pathways 5, 7, and 12), respectively, for the future residential land use scenario at followup fieldwork Site 50.

The total potential carcinogenic risk and noncarcinogenic hazard for ingestion of contaminated drinking water (pathway 5) are 1E-04 and 8E-01, respectively. These results are unchanged from those calculated in the Baseline RA (Dames & Moore, 1992a). As in the Baseline RA, the potential carcinogenic risk of 1E-04 is due to the presence of arsenic in Site 50 groundwater.

The total potential carcinogenic risk and noncarcinogenic hazard for dermal absorption of contaminants in groundwater during showering (pathway 7) are 1E-09 and 9E-06, respectively. These results are slightly lower than those calculated in the Baseline RA (2E-09 and 1E-05, respectively (Dames & Moore, 1992a)).

The total potential carcinogenic risk and noncarcinogenic hazard for consumption of crops irrigated by contaminated groundwater or grown in contaminated soil (pathway 12) are 4E-07 and 3E-03, respectively. These results are slightly lower than those calculated in the Baseline RA (5E-07 and 4E-03, respectively (Dames & Moore, 1992a)).

Table 7-208* presents the multiple pathway potential carcinogenic risk and noncarcinogenic hazard for the future residential land use scenario at Site 50, which are 1E-04 and 8E-01, respectively. These results are unchanged from those calculated in the Baseline RA (Dames & Moore, 1992a). The ingestion of contaminated drinking water (pathway 5) appears to present the greatest potential risk.

TABLE 7-205*

Potential Carcinogenic Risks and Noncarcinogenic Hazards Due to Ingestion of Groundwater at Site 50 Future Residential Land Use Scenario

Analyte	Carcinogenic Intake (mg/kg/day)	Slope Factor 1/(mg/kg/day)	Risk
Arsenic	6.47E-05	1.75E+00	1E-04
Copper	--	--	--
Nickel	--	--	--
Vanadium	--	--	--
Zinc	--	--	--
Cyanide	--	--	--
RDX	2.28E-05	1.1E-01	3E-06
Total			1E-04 (a)

Analyte	Noncarcinogenic Intake (mg/kg/day)	Reference Dose (mg/kg/day)	Hazard Quotient
Arsenic	1.51E-04	3.0E-04	5E-01
Copper	2.03E-04	3.7E-02	5E-03
Nickel	1.47E-03	2.0E-02	7E-02
Vanadium	8.47E-04	7.0E-03	1E-01
Zinc	1.43E-02	2.0E-01	7E-02
Cyanide	3.32E-04	2.0E-02	2E-02
RDX	5.32E-05	3.0E-03	2E-02
Total			8E-01 (a)

"--" Not calculated because contaminant is not considered a carcinogen or potency factor is not available.

* - Replaces original Table 7-205 in the Final Baseline RA; Dames & Moore, 1992a.

(a) - Unchanged

TABLE 7-206*

Potential Carcinogenic Risks and Noncarcinogenic Hazards Due to Dermal Absorption of Groundwater Contaminants at Site 50 Future Residential Land Use Scenario

Analyte	Carcinogenic Intake (mg/kg/day)	Slope Factor 1/(mg/kg/day)	Risk	
RDX	1.36E-08	1.1E-01	1E-09	
Total			1E-09	(a)

Analyte	Noncarcinogenic Intake (mg/kg/day)	Reference Dose (mg/kg/day)	Hazard Quotient	
RDX	3.16E-08	3.0E-03	1E-05	
Total			1E-05	(a)

* - Replaces original Table 7-206 in the Final Baseline RA; Dames & Moore, 1992a.

(a) - Final Baseline RA results were a total potential carcinogenic risk of 2E-09 and a hazard index of 1E-05 (Dames & Moore, 1992a).

TABLE 7-207*

Potential Carcinogenic Risks and Noncarcinogenic Hazards Due to the Consumption of Crops at Site 50 Future Residential Land Use Scenario

Analyte	Carcinogenic Intake (mg/kg/day)	Slope Factor 1/(mg/kg/day)	Risk	
Arsenic	1.04E-08	1.75E+00	2E-08	
Copper	--	--	--	
Nickel	--	--	--	
Vanadium	--	--	--	
Zinc	--	--	--	
Cyanide	--	--	--	
RDX	3.28E-06	1.1E-01	4E-07	
Total			4E-07	(a)

Analyte	Noncarcinogenic Intake (mg/kg/day)	Reference Dose (mg/kg/day)	Hazard Quotient	
Arsenic	2.42E-08	3.0E-04	8E-05	
Copper	xx	3.7E-02	xx	
Nickel	2.95E-06	2.0E-02	1E-04	
Vanadium	xx	7.0E-03	xx	
Zinc	xx	2.0E-01	xx	
Cyanide	xx	2.0E-02	xx	
RDX	7.65E-06	3.0E-03	3E-03	
Total			3E-03	(a)

"--" - Not calculated because contaminant is not considered a carcinogen or potency factor is not available.

"xx" - Quantitative information on uptake factors not available.

* - Replaces original Table 7-207 in the Final Baseline RA; Dames & Moore, 1992a.

(a) - Final Baseline RA results were a total potential carcinogenic risk of 5E-07 and a hazard index of 4E-03 (Dames & Moore, 1992a).

TABLE 7-208*

Multiple Pathway Potential Carcinogenic Risks and Noncarcinogenic Hazards at Site 50 --Future Residential Land Use Scenario

Pathway No.	Pathway Description	Risk		Hazard Index	
1	Dermal Absorption of Contaminants in Soil	NA		NA	
2	Incidental Ingestion of Soil	NA		NA	
3	Inhalation of Dust	NA		NA	
5	Ingestion of Groundwater	1E-04		8E-01	
6	Inhalation of Volatile Contaminants Emitted From Groundwater During Showering	NA		NA	
7	Dermal Absorption of Groundwater Contaminants During Showering	1E-09		9E-06	
12	Consumption of Crops	4E-07		3E-03	
	Total	1E-04	(a)	8E-01	(a)

"NA" - Pathway not applicable to or quantified for site.

* - Replaces original Table 7-208 in the Final Baseline RA; Dames & Moore, 1992a.

(a) - Unchanged

7.3.5* Operable Unit E: Deactivation Furnace and Southwestern Warehouse Area

7.3.5.3* Site 26: Metal Ingot Stockpiles. Tables 7-222* through 7-224* present the estimated carcinogenic intakes, noncarcinogenic intakes, potency factors, reference doses, potential risks, and potential hazards, as applicable, for incidental soil ingestion, dust inhalation, and crop ingestion (pathways 2, 3, and 12), respectively, for the future residential land use scenario at followup fieldwork Site 26.

Because potency factors are not available for any of the soil contaminants of concern at Site 26, carcinogenic risks are not calculated for the three pathways. The total potential noncarcinogenic hazard for inadvertent ingestion of contaminated soil (pathway 2) is 4E-03. This result is slightly lower than that of 5E-03 calculated in the Baseline RA (Dames & Moore, 1992a)). As in the Baseline RA, the total potential noncarcinogenic hazard for inhalation of contaminated soil as airborne dust (pathway 3) is not calculated, because inhalation reference doses are not available for the contaminants of concern. As in the Baseline RA, the total potential noncarcinogenic hazard for consumption of crops irrigated by contaminated groundwater or grown in contaminated soil (pathway 12) is not calculated, because neither oral reference doses nor uptake factors are available for the contaminants of concern.

Table 7-225* presents the multiple pathway potential noncarcinogenic hazard for the future residential land use scenario at Site 26. A potential carcinogenic risk is not calculated, because potency factors are not available for any of the contaminants of concern. The total potential noncarcinogenic hazard is 4E-03, which is slightly lower than that of 5E-03 calculated in the Baseline RA (Dames & Moore, 1992a).

7.3.6* Operable Unit F: Sewage Treatment Plant and Vicinity

7.3.6.1* Site 30: Stormwater Discharge Area. Tables 7-246* through 7-248* present the estimated carcinogenic intakes, noncarcinogenic intakes, potency factors, reference doses, potential risks, and potential hazards, as applicable, for incidental soil ingestion,

TABLE 7-222*

Potential Carcinogenic Risks and Noncarcinogenic Hazards Due to Incidental Ingestion of Soil at Site 26 Future Residential Land Use Scenario

Analyte	Carcinogenic Intake (mg/kg/day)	Slope Factor 1/(mg/kg/day)	Risk
Lead	--	--	--
Silver	--	--	--
Zinc	--	--	--
Total			0E+00 (a)

Analyte	Noncarcinogenic Intake (mg/kg/day)	Reference Dose (mg/kg/day)	Hazard Quotient
Lead	1.71E-03	**	**
Silver	3.19E-06	5.0E-03	6E-04
Zinc	6.87E-04	2.0E-01	3E-03
Total			4E-03 (a)

"--" - Not calculated because contaminant is not considered a carcinogen or potency factor is not available.

"**" - Reference dose is not available.

* - Replaces original Table 7-222 in the Final Baseline RA; Dames & Moore, 1992a.

(a) - Final Baseline RA results were a total potential carcinogenic risk of 0E+00 and a hazard index of 5E-03 (Dames & Moore, 1992a).

TABLE 7-223*

Potential Carcinogenic Risks and Noncarcinogenic Hazards Due to Inhalation of Dust at Site 26 Future Residential Land Use Scenario

Analyte	Carcinogenic Intake (mg/kg/day)	Slope Factor 1/(mg/kg/day)	Risk
Lead	"-"	"-"	"-"
Silver	"-"	"-"	"-"
Zinc	"-"	"-"	"-"
Total			0E+00 (a)

Analyte	Noncarcinogenic Intake (mg/kg/day)	Reference Dose (mg/kg/day)	Hazard Quotient
Lead	2.49E-07	"**"	"**"
Silver	4.64E-10	"**"	"**"
Zinc	9.97E-08	"**"	"**"
Total			0E+00 (a)

"-" - Not calculated because contaminant is not considered a carcinogen or potency factor is not available.
"**" - Reference dose is not available.
* - Replaces original Table 7-223 in the Final Baseline RA; Dames & Moore, 1992a.
(a) - Results are unchanged from those presented in the Final Baseline RA (Dames & Moore, 1992a).

TABLE 7-224*

Potential Carcinogenic Risks and Noncarcinogenic Hazards Due to the Consumption of Crops at Site 26 Future Residential Land Use Scenario

Analyte	Carcinogenic Intake (mg/kg/day)	Slope Factor 1/(mg/kg/day)	Risk
Lead	--	--	--
Silver	--	--	--
Zinc	--	--	--
Total			0E+00 (a)

Analyte	Noncarcinogenic Intake (mg/kg/day)	Reference Dose (mg/kg/day)	Hazard Quotient
Lead	2.57E-03	**	**
Silver	xx	5.00E-03	xx
Zinc	xx	2.0E-01	xx
Total			0E+00 (a)

"--" - Not calculated because contaminant is not considered a carcinogen or potency factor is not available.

"xx" - Quantitative information on uptake factors not available.

"**" - Reference dose not available.

* - Replaces original Table 7-224 in the Final Baseline RA; Dames & Moore, 1992a.

(a) - Results are unchanged from those presented in the Final Baseline RA (Dames & Moore, 1992a).

TABLE 7-225*
Multiple Pathway Potential Carcinogenic Risks and Noncarcinogenic Hazards at Site 26 --Future Residential Land Use Scenario

Pathway No.	Pathway Description	Risk	Hazard Index
1	Dermal Absorption of Contaminants in Soil	NA	NA
2	Incidental Ingestion of Soil	0E+00	4E-03
3	Inhalation of Dust	0E+00	0E+00
5	Ingestion of Groundwater	NA	NA
6	Inhalation of Volatile Contaminants Emitted From Groundwater During Showering	NA	NA
7	Dermal Absorption of Groundwater Contaminants During Showering	NA	NA
12	Consumption of Crops	0E+00	0E+00
	Total	0E+00 (a)	4E-03 (a)

"NA" - Pathway not applicable to or quantified for site.

* - Replaces original Table 7-225 in the Final Baseline RA; Dames & Moore, 1992a.

(a) - Final Baseline RA results were a total potential carcinogenic risk of 0E+00 and a hazard index of 5E-03 (Dames & Moore, 1992a).

TABLE 7-246*

Potential Carcinogenic Risks and Noncarcinogenic Hazards
Due to Incidental Ingestion of Soil at Site 30
Future Residential Land Use Scenario

Analyte	Carcinogenic Intake (mg/kg/day)	Slope Factor 1/(mg/kg/day)	Risk
Lead	--	--	--
Silver	--	--	--
Zinc	--	--	--
DDD	3.15E-07	2.4E-01	8E-08
DDE	6.58E-08	3.4E-01	2E-08
DDT	7.59E-07	3.4E-01	3E-07
Total			4E-07 (a)

Analyte	Noncarcinogenic Intake (mg/kg/day)	Reference Dose (mg/kg/day)	Hazard Quotient
Lead	6.94E-04	**	**
Silver	2.55E-06	5.0E-03	5E-04
Zinc	1.17E-03	2.0E-01	6E-03
DDD	7.34E-07	**	**
DDE	1.53E-07	**	**
DDT	1.77E-06	5.0E-04	4E-03
Total			1E-02 (a)

"--" - Not calculated because contaminant is not considered a carcinogen or potency factor is not available.

"**" - Reference dose is not available.

* - Replaces original Table 7-246 in the Final Baseline RA; Dames & Moore, 1992a.

(a) - Final Baseline RA results were a total potential carcinogenic risk of 2E-07 and a hazard index of 7E-03 (Dames & Moore, 1992a).

TABLE 7-247*

Potential Carcinogenic Risks and Noncarcinogenic Hazards Due to Inhalation of Dust at Site 30 Future Residential Land Use Scenario

Analyte	Carcinogenic Intake (mg/kg/day)	Slope Factor 1/(mg/kg/day)	Risk	
Lead	–	–	–	
Silver	–	–	–	
Zinc	–	–	–	
DDD	1.66E-11	–	–	
DDE	3.46E-12	–	–	
DDT	4.00E-11	3.40E-01	1E-11	
Total			1E-11	(a)

Analyte	Noncarcinogenic Intake (mg/kg/day)	Reference Dose (mg/kg/day)	Hazard Quotient	
Lead	3.65E-08	**	**	
Silver	1.34E-10	**	**	
Zinc	6.14E-08	**	**	
DDD*	3.87E-11	**	**	
DDE	8.08E-12	**	**	
DDT	9.33E-11	**	**	
Total			0E+00	(a)

"–" - Not calculated because contaminant is not considered a carcinogen or potency factor is not available.

"**" - Reference dose is not available.

* - Replaces original Table 7-247 in the Final Baseline RA; Dames & Moore, 1992a.

(a) - Final Baseline RA results were a total potential carcinogenic risk of 4E-12 and a hazard index of 0E+00 (Dames & Moore, 1992a).

TABLE 7-248*

Potential Carcinogenic Risks and Noncarcinogenic Hazards Due to the Consumption of Crops at Site 30 Future Residential Land Use Scenario

Analyte	Carcinogenic Intake (mg/kg/day)	Slope Factor 1/(mg/kg/day)	Risk	
Lead	--	--	--	
Silver	--	--	--	
Zinc	--	--	--	
DDD	2.24E-06	2.4E-01	5E-07	
DDE	3.93E-07	3.4E-01	1E-07	
DDT	1.86E-06	3.4E-01	6E-07	
Total			1E-06	(a)

Analyte	Noncarcinogenic Intake (mg/kg/day)	Reference Dose (mg/kg/day)	Hazard Quotient	
Lead	1.04E-03	**	**	
Silver	xx	5.0E-03	xx	
Zinc	xx	2.0E-01	xx	
DDD	5.22E-06	**	**	
DDE	9.17E-07	**	**	
DDT	4.34E-06	5.0E-04	9E-03	
Total			9E-03	(a)

"--" - Not calculated because contaminant is not considered a carcinogen or potency factor is not available.

"xx" - Quantitative information on uptake factors not available.

"**" - Reference dose is not available.

* - Replaces original Table 7-248 in the Final Baseline RA; Dames & Moore, 1992a.

(a) - Final Baseline RA results were a total potential carcinogenic risk of 9E-07 and a hazard index of 3E-03 (Dames & Moore, 1992a).

dust inhalation, and crop ingestion (pathways 2, 3, and 12), respectively, for the future residential land use scenario at followup fieldwork Site 30.

The total potential carcinogenic risk and noncarcinogenic hazard for inadvertent ingestion of contaminated soil (pathway 2) are 4E-07 and 1E-02, respectively. These results are slightly higher than those calculated in the Baseline RA (2E-07 and 7E-03, respectively (Dames & Moore, 1992a)).

The total potential carcinogenic risk for inhalation of contaminated soil as airborne dust (pathway 3) is 1E-11, which is slightly higher than that of 4E-12 calculated in the Baseline RA (Dames & Moore, 1992a). As in the Baseline RA, noncarcinogenic hazard is not calculated, because inhalation reference doses are not available for the contaminants of concern.

The total potential carcinogenic risk and noncarcinogenic hazard for consumption of crops irrigated by contaminated groundwater or grown in contaminated soil (pathway 12) are 1E-06 and 9E-03, respectively. These results are slightly higher than those calculated in the Baseline RA (9E-07 and 3E-03, respectively (Dames & Moore, 1992a)). The potential carcinogenic risk of 1E-06 is due mainly to the presence of DDD and DDT in soil.

Table 7-249* presents the multiple pathway potential carcinogenic risk and noncarcinogenic hazard for the future residential land use scenario at Site 30, which are 1E-06 and 2E-02, respectively. These results are equal to or slightly greater than those calculated in the Baseline RA (1E-06 and 1E-02, respectively (Dames & Moore, 1992a)). The crop ingestion pathway appears to present the greatest potential risk.

7.3.6.2* <u>Site 48: Pipe Discharge Area</u>. Tables 7-250* through 7-252* present the estimated carcinogenic intakes, noncarcinogenic intakes, potency factors, reference doses, potential risks, and potential hazards, as applicable, for incidental soil ingestion, dust inhalation, and crop ingestion (pathways 2, 3, and 12), respectively, for the future residential land use scenario at followup fieldwork Site 48.

TABLE 7-249*

Multiple Pathway Potential Carcinogenic Risks and Noncarcinogenic Hazards at Site 30 --Future Residential Land Use Scenario

Pathway No.	Pathway Description	Risk		Hazard Index	
1	Dermal Absorption of Contaminants in Soil	NA		NA	
2	Incidental Ingestion of Soil	4E-07		1E-02	
3	Inhalation of Dust	1E-11		0E+00	
5	Ingestion of Groundwater	NA		NA	
6	Inhalation of Volatile Contaminants Emitted From Groundwater During Showering	NA		NA	
7	Dermal Absorption of Groundwater Contaminants During Showering	NA		NA	
12	Consumption of Crops	1E-06		9E-03	
	Total	1E-06	(a)	2E-02	(a)

"NA" - Pathway not applicable to or quantified for site.

* - Replaces original Table 7-249 in the Final Baseline RA; Dames & Moore, 1992a.

(a) - Final Baseline RA results were a total potential carcinogenic risk of 1E-06 and a hazard index of 1E-02 (Dames & Moore, 1992a).

TABLE 7-250*

Potential Carcinogenic Risks and Noncarcinogenic Hazards Due to Incidental Ingestion of Soil at Site 48 Future Residential Land Use Scenario

Analyte	Carcinogenic Intake (mg/kg/day)	Slope Factor 1/(mg/kg/day)	Risk
Cadmium	–	–	–
Copper	–	–	–
Lead	–	–	–
Mercury	–	–	–
Silver	–	–	–
Zinc	–	–	–
Nitrite/nitrate	–	–	–
DDD	7.56E-06	2.4E-01	2E-06
DDE	1.94E-06	3.4E-01	7E-07
DDT	1.61E-06	3.4E-01	5E-07
Total			3E-06 (a)

Analyte	Noncarcinogenic Intake (mg/kg/day)	Reference Dose (mg/kg/day)	Hazard Quotient
Cadmium	1.63E-05	1.0E-03	2E-02
Copper	3.02E-04	3.7E-02	8E-03
Lead	3.11E-04	**	**
Mercury	2.04E-06	3.0E-04	7E-03
Silver	7.78E-06	5.0E-03	2E-03
Zinc	1.25E-03	2.0E-01	6E-03
Nitrite/nitrate	7.31E-05	1.6E+00	5E-05
DDD	1.76E-05	**	**
DDE	4.53E-06	**	**
DDT	3.76E-06	5.0E-04	8E-03
Total			5E-02 (a)

"–" - Not calculated because contaminant is not considered a carcinogen or potency factor is not available.

"**" - Reference dose is not available.

* - Replaces original Table 7-250 in the Final Baseline RA; Dames & Moore, 1992a.

(a) - Final Baseline RA results were a total potential carcinogenic risk of 5E-06 and a hazard index of 7E-02 (Dames & Moore, 1992a).

TABLE 7-251*

Potential Carcinogenic Risks and Noncarcinogenic Hazards Due to Inhalation of Dust at Site 48 Future Residential Land Use Scenario

Analyte	Carcinogenic Intake (mg/kg/day)	Slope Factor 1/(mg/kg/day)	Risk
Cadmium	3.68E-10	6.3E+00	2E-09
Copper	--	--	--
Lead	--	--	--
Mercury	--	--	--
Silver	--	--	--
Zinc	--	--	--
Nitrite/nitrate	--	--	--
DDD	3.98E-10	--	--
DDE	1.02E-10	--	--
DDT	8.49E-11	3.4E-01	3E-11
Total			2E-09 (a)

Analyte	Noncarcinogenic Intake (mg/kg/day)	Reference Dose (mg/kg/day)	Hazard Quotient
Cadmium	8.60E-10	**	**
Copper	1.59E-08	**	**
Lead	1.64E-08	**	**
Mercury	1.07E-10	9.0E-05	1E-06
Silver	4.10E-10	**	**
Zinc	6.60E-08	**	**
Nitrite/nitrate	3.85E-09	**	**
DDD	9.29E-10	**	**
DDE	2.38E-10	**	**
DDT	1.98E-10	**	**
Total			1E-06 (a)

"--" - Not calculated because contaminant is not considered a carcinogen or potency factor is not available.

"**" - Reference dose is not available.

* - Replaces original Table 7-251 in the Final Baseline RA; Dames & Moore, 1992a.

(a) - Final Baseline RA results were a total potential carcinogenic risk of 3E-09 and a hazard index of 2E-06 (Dames & Moore, 1992a).

TABLE 7-252*

Potential Carcinogenic Risks and Noncarcinogenic Hazards Due to the Consumption of Crops at Site 48 Future Residential Land Use Scenario

Analyte	Carcinogenic Intake (mg/kg/day)	Slope Factor 1/(mg/kg/day)	Risk	
Cadmium	–	–	–	
Copper	–	–	–	
Lead	–	–	–	
Mercury	–	–	–	
Silver	–	–	–	
Zinc	–	–	–	
Nitrite/nitrate	–	–	–	
DDD	5.37E-05	2.4E-01	1E-05	
DDE	1.16E-05	3.4E-01	4E-06	
DDT	3.95E-06	3.4E-01	1E-06	
Total			2E-05	(a)

Analyte	Noncarcinogenic Intake (mg/kg/day)	Reference Dose (mg/kg/day)	Hazard Quotient	
Cadmium	2.94E-04	1.0E-03	3E-01	
Copper	xx	3.7E-02	xx	
Lead	4.66E-04	**	**	
Mercury	5.50E-05	3.0E-04	2E-01	
Silver	xx	5.0E-03	xx	
Zinc	xx	2.0E-01	xx	
Nitrite/nitrate	xx	1.6E+00	xx	
DDD	1.25E-04	**	**	
DDE	2.71E-05	**	**	
DDT	9.22E-06	5.0E-04	2E-02	
Total			5E-01	(a)

"–" - Not calculated because contaminant is not considered a carcinogen or potency factor is not available.

"xx" - Quantitative information on uptake factors not available.

"**" - Reference dose is not available.

* - Replaces original Table 7-252 in the Final Baseline RA; Dames & Moore, 1992a.

(a) - Final Baseline RA results were a total potential carcinogenic risk of 3E-05 and a hazard index of 7E-01 (Dames & Moore, 1992a).

The total potential carcinogenic risk and noncarcinogenic hazard for inadvertent ingestion of contaminated soil (pathway 2) are 3E-06 and 5E-02, respectively. These results are slightly lower than those calculated in the Baseline RA (5E-06 and 7E-02, respectively (Dames & Moore, 1992a)). As in the Baseline RA, the potential carcinogenic risk is due to the presence of DDD, DDE, and DDT.

The total potential carcinogenic risk and noncarcinogenic hazard for inhalation of contaminated soil as airborne dust (pathway 3) are 2E-09 and 1E-06, respectively. These results are slightly lower than those calculated in the Baseline RA (3E-09 and 2E-06, respectively (Dames & Moore, 1992a)).

The total potential carcinogenic risk and noncarcinogenic hazard for consumption of crops irrigated by contaminated groundwater or grown in contaminated soil (pathway 12) are 2E-05 and 5E-01, respectively. These results are slightly lower than those calculated in the Baseline RA (3E-05 and 7E-01, respectively (Dames & Moore, 1992a)). As in the Baseline RA, the potential carcinogenic risk of 2E-05 is due to the presence of DDD, DDE, and DDT.

Table 7-253* presents the multiple pathway potential carcinogenic risk and noncarcinogenic hazard for the future residential land use scenario at Site 48, which are 2E-05 and 6E-01, respectively. These results are slightly lower than those calculated in the Baseline RA (4E-05 and 8E-01, respectively (Dames & Moore, 1992a)). The crop ingestion pathway appears to present the greatest potential risk.

7.3.7* Operable Unit G: Active Landfill (Site 11)

Tables 7-254* through 7-256* present the estimated carcinogenic intakes, noncarcinogenic intakes, potency factors, reference doses, potential risks, and potential hazards, as applicable, for ingestion of contaminated drinking water, dermal absorption of contaminants in groundwater, and crop ingestion (pathways 5, 7, and 12), respectively, for the future residential land use scenario at Site 11.

The total potential carcinogenic risk and noncarcinogenic hazard for ingestion of contaminated drinking water (pathway 5) are 2E-04 and 2, respectively. These

TABLE 7-253*

Multiple Pathway Potential Carcinogenic Risks and Noncarcinogenic Hazards at Site 48 --Future Residential Land Use Scenario

Pathway No.	Pathway Description	Risk		Hazard Index	
1	Dermal Absorption of Contaminants in Soil	NA		NA	
2	Incidental Ingestion of Soil	3E-06		5E-02	
3	Inhalation of Dust	2E-09		1E-06	
5	Ingestion of Groundwater	NA		NA	
6	Inhalation of Volatile Contaminants Emitted From Groundwater During Showering	NA		NA	
7	Dermal Absorption of Groundwater Contaminants During Showering	NA		NA	
12	Consumption of Crops	2E-05		5E-01	
	Total	2E-05	(a)	6E-01	(a)

"NA" - Pathway not applicable to or quantified for site.

* - Replaces original Table 7-253 in the Final Baseline RA; Dames & Moore, 1992a.

(a) - Final Baseline RA results were a total potential carcinogenic risk of 4E-05 and a hazard index of 8E-01 (Dames & Moore, 1992a).

TABLE 7-254*

Potential Carcinogenic Risks and Noncarcinogenic Hazards Due to Ingestion of Groundwater at Site 11 Future Residential Land Use Scenario

Analyte	Carcinogenic Intake (mg/kg/day)	Slope Factor 1/(mg/kg/day)	Risk
Antimony	--	--	--
Arsenic	8.82E-05	1.75E+00	2E-04
Barium	--	--	--
Chromium	--	--	--
Copper	--	--	--
Lead	--	--	--
Selenium	--	--	--
Vanadium	--	--	--
Zinc	--	--	--
Cyanide	--	--	--
24DNT	3.96E-05	6.8E-01	3E-05
26DNT	1.08E-05	6.8E-01	7E-06
RDX	1.21E-05	1.1E-01	1E-06
Tetryl	--	--	--
Total			2E-04 (a)

Analyte	Noncarcinogenic Intake (mg/kg/day)	Reference Dose (mg/kg/day)	Hazard Quotient
Antimony	9.04E-05	4.0E-04	2E-01
Arsenic	2.06E-04	3.0E-04	7E-01
Barium	1.85E-03	7.0E-02	3E-02
Chromium	4.47E-04	5.0E-03	9E-02
Copper	3.81E-04	3.7E-02	1E-02
Lead	8.03E-05	**	**
Selenium	9.37E-04	5.0E-03	2E-01
Vanadium	1.50E-03	7.0E-03	2E-01
Zinc	7.26E-04	2.0E-01	4E-03
Cyanide	1.74E-04	2.0E-02	9E-03
24DNT	9.23E-05	2.0E-03	5E-02
26DNT	2.51E-05	1.0E-03	3E-02
RDX	2.82E-05	3.0E-03	9E-03
Tetryl	1.72E-05	1.0E-02	2E-03
Total			2E+00 (a)

"--" Not calculated because contaminant is not considered a carcinogen or potency factor is not available.

"**" - Reference dose not available.

* - Replaces original Table 7-254 in the Final Baseline RA; Dames & Moore, 1992a.

(a) - Results are unchanged from those presented in the Final Baseline RA (Dames & Moore, 1992a).

TABLE 7-255*

Potential Carcinogenic Risks and Noncarcinogenic Hazards Due to Dermal Absorption of Groundwater Contaminants at Site 11 Future Residential Land Use Scenario

Analyte	Carcinogenic Intake (mg/kg/day)	Slope Factor 1/(mg/kg/day)	Risk	
24DNT	2.56E-07	6.8E-01	2E-07	
26DNT	5.86E-08	6.8E-01	4E-08	
RDX	7.20E-09	1.1E-01	8E-10	
Tetryl	–	–	–	
Total			2E-07	(a)

Analyte	Noncarcinogenic Intake (mg/kg/day)	Reference Dose (mg/kg/day)	Hazard Quotient	
24DNT	5.96E-07	2.0E-03	3E-04	
26DNT	1.37E-07	1.0E-03	1E-04	
RDX	1.68E-08	3.0E-03	6E-06	
Tetryl	1.46E-08	1.0E-02	1E-06	
Total			4E-04	(a)

"–" - Not calculated because contaminant is not considered a carcinogen or potency factor is not available.

* - Replaces original Table 7-255 in the Final Baseline RA; Dames & Moore, 1992a.

(a) - Final Baseline RA results were a total potential carcinogenic risk of 3E-07 and a hazard index of 6E-04 (Dames & Moore, 1992a).

TABLE 7-256*

Potential Carcinogenic Risks and Noncarcinogenic Hazards Due to the Consumption of Crops at Site 11 Future Residential Land Use Scenario

Analyte	Carcinogenic Intake (mg/kg/day)	Slope Factor 1/(mg/kg/day)	Risk
Antimony	--	--	--
Arsenic	1.41E-08	1.75E+00	2E-08
Barium	--	--	--
Chromium	--	--	--
Copper	--	--	--
Lead	--	--	--
Selenium	--	--	--
Vanadium	--	--	--
Zinc	--	--	--
Cyanide	--	--	--
24DNT	5.04E-06	6.8E-01	3E-06
26DNT	1.38E-06	6.8E-01	9E-07
RDX	1.74E-06	1.1E-01	2E-07
Tetryl	--	--	--
Total			5E-06 (a)

Analyte	Noncarcinogenic Intake (mg/kg/day)	Reference Dose (mg/kg/day)	Hazard Quotient
Antimony	xx	4.0E-04	xx
Arsenic	3.29E-08	3.0E-04	1E-04
Barium	xx	7.0E-02	xx
Chromium	1.79E-08	5.0E-03	4E-06
Copper	xx	3.7E-02	xx
Lead	1.61E-08	**	**
Selenium	xx	5.0E-03	xx
Vanadium	xx	7.0E-03	xx
Zinc	xx	2.0E-01	xx
Cyanide	xx	2.0E-02	xx
24DNT	1.18E-05	2.0E-03	6E-03
26DNT	3.23E-06	1.0E-03	3E-03
RDX	4.06E-06	3.0E-03	1E-03
Tetryl	2.27E-06	1.0E-02	2E-04
Total			1E-02 (a)

"--" - Not calculated because contaminant is not considered a carcinogen or potency factor is not available.

"xx" - Quantitative information on uptake factors not available.

"**" - Reference dose not available.

* - Replaces original Table 6-228 in the Final Baseline RA; Dames & Moore, 1992a.

(a) - Final Baseline RA results were a total potential carcinogenic risk of 6E-06 and a hazard index of 2E-02 (Dames & Moore, 1992a).

results are unchanged from those calculated in the Baseline RA. As in the Baseline RA, the potential carcinogenic risk of 2E-04 is due mainly to the presence of arsenic. The potential noncarcinogenic hazard of 2 is due mainly to the presence of antimony, arsenic, selenium, and vanadium. Of these four contaminants, only arsenic and selenium share a similar adverse health effect (i.e., peripheral neuropathy) based on chronic oral exposure. Adverse health effects of antimony include decreased lifespan, altered cholesterol levels, decreased glucose levels, and decreased heart weight. Vanadium mildly affects the gastrointestinal, renal, and respiratory systems. Based on this evaluation, the hazard index of 2 may be an overestimate, because effects for most of the contaminants differ. Summing the hazard quotients for arsenic (0.7) and selenium (0.2) may be appropriate to yield a hazard index of 1 for these two contaminants. For antimony and vanadium, it may be more appropriate to separately consider the hazard quotients.

The total potential carcinogenic risk and noncarcinogenic hazard for absorption of contaminants in groundwater during showering (pathway 7) are 2E-07 and 4E-04, respectively. These results are slightly lower than those calculated in the Baseline RA (3E-07 and 6E-04, respectively (Dames & Moore, 1992a)).

The total potential carcinogenic risk and noncarcinogenic hazard for consumption of crops irrigated by contaminated groundwater or grown in contaminated soil (pathway 12) are 5E-06 and 1E-02, respectively. These results are slightly lower than those calculated in the Baseline RA (6E-06 and 2E-02, respectively (Dames & Moore, 1992a)). As in the Baseline RA, the potential carcinogenic risk of 5E-06 is due mainly to the presence of 2,4-DNT and 2,6-DNT.

Table 7-257* presents the multiple pathway potential carcinogenic risk and noncarcinogenic hazard for the future residential land use scenario at Site 11, which are 2E-04 and 2, respectively. These results are unchanged from those calculated in the Baseline RA. The ingestion of contaminated drinking water pathway appears to present the greatest potential risk and hazard.

TABLE 7-257*

Multiple Pathway Potential Carcinogenic Risks and Noncarcinogenic Hazards at Site 11 --Future Residential Land Use Scenario

Pathway No.	Pathway Description	Risk	Hazard Index
1	Dermal Absorption of Contaminants in Soil	NA	NA
2	Incidental Ingestion of Soil	NA	NA
3	Inhalation of Dust	NA	NA
5	Ingestion of Groundwater	2E-04	2E+00
6	Inhalation of Volatile Contaminants Emitted From Groundwater During Showering	NA	NA
7	Dermal Absorption of Groundwater Contaminants During Showering	2E-07	4E-04
12	Consumption of Crops	5E-06	1E-02
	Total	2E-04 (a)	2E+00 (a)

"NA" - Pathway not applicable to or quantified for site.

* - Replaces original Table 7-257 in the Final Baseline RA; Dames & Moore, 1992a.

(a) - Results are unchanged from those presented in the Final Baseline RA (Dames & Moore, 1992a).

7.3.8* Operable Unit H: Defense Re-utilization Marketing Office and Other Administration Area Sites

7.3.8.1* Site 22: DRMO Area. Tables 7-258* through 7-260* present the estimated carcinogenic intakes, noncarcinogenic intakes, potency factors, reference doses, potential risks, and potential hazards, as applicable, for incidental soil ingestion, dust inhalation, and crop ingestion (pathways 2, 3, and 12), respectively, for the future residential land use scenario at followup fieldwork Site 22.

The total potential carcinogenic risk and noncarcinogenic hazard for inadvertent ingestion of contaminated soil (pathway 2) are 7E-06 and 1E+00, respectively. These results are slightly greater than or equal to those calculated in the Baseline RA (3E-07 and 1E+00, respectively (Dames & Moore, 1992a)). The potential carcinogenic risk of 7E-06 is due mainly to the presence of beryllium.

The total potential carcinogenic risk and noncarcinogenic hazard for inhalation of contaminated soil as airborne dust (pathway 3) are 1E-08 and 4E-04, respectively. These results are slightly lower than those calculated in the Baseline RA (3E-08 and 5E-04, respectively (Dames & Moore, 1992a)).

The total potential carcinogenic risk and noncarcinogenic hazard for consumption of crops irrigated by contaminated groundwater or grown in contaminated soil (pathway 12) are 2E-06 and 7E-01, respectively. The potential risk is slightly higher than that of 1E-06 calculated in the Baseline RA (Dames & Moore, 1992a) and is mainly due to the presence of beryllium in soil. The hazard is slightly lower than that of 2E+00 calculated in the Baseline RA (Dames & Moore, 1992a).

Table 7-261* presents the multiple pathway potential carcinogenic risk and noncarcinogenic hazard for the future residential land use scenario at Site 22, which are 9E-06 and 2, respectively. The potential risk is slightly higher than that of 1E-06 calculated in the Baseline RA, while the noncarcinogenic hazard is slightly lower than that of 3 calculated in the Baseline RA (Dames & Moore, 1992a). As in the Baseline

TABLE 7-258*

Potential Carcinogenic Risks and Noncarcinogenic Hazards Due to Incidental Ingestion of Soil at Site 22 Future Residential Land Use Scenario

Analyte	Carcinogenic Intake (mg/kg/day)	Slope Factor 1/(mg/kg/day)	Risk
Antimony	–	–	–
Barium	–	–	–
Beryllium	1.56E-06	4.3E+00	7E-06
Cadmium	–	–	–
Copper	–	–	–
Lead	–	–	–
Mercury	–	–	–
Potassium	–	–	–
Silver	–	–	–
Thallium	–	–	–
Zinc	–	–	–
DDD	6.11E-08	2.4E-01	1E-08
DDE	7.83E-08	3.4E-01	3E-08
DDT	2.02E-07	3.4E-01	7E-08
Total			7E-06 (a)

Analyte	Noncarcinogenic Intake (mg/kg/day)	Reference Dose (mg/kg/day)	Hazard Quotient
Antimony	1.20E-04	4.0E-04	3E-01
Barium	4.60E-04	7.0E-02	7E-03
Beryllium	3.65E-06	5.0E-03	7E-04
Cadmium	3.73E-05	1.0E-03	4E-02
Copper	2.70E-03	3.7E-02	7E-02
Lead	3.58E-03	**	**
Mercury	6.25E-07	3.0E-04	2E-03
Potassium	5.55E-03	**	**
Silver	5.74E-07	5.0E-03	1E-04
Thallium	6.61E-05	8.0E-05	8E-01
Zinc	1.95E-03	2.0E-01	1E-02
DDD	1.42E-07	**	**
DDE	1.83E-07	**	**
DDT	4.71E-07	5.0E-04	9E-04
Total			1E+00 (a)

"–" - Not calculated because contaminant is not considered a carcinogen or potency factor is not available.
"**" - Reference dose is not available.
* - Replaces original Table 7-258 in the Final Baseline RA; Dames & Moore, 1992a.
(a) - Final Baseline RA results were a total carcinogenic risk of 3E-07 and a hazard index of 1 (Dames & Moore, 1992a).

TABLE 7-259*

Potential Carcinogenic Risks and Noncarcinogenic Hazards
Due to Inhalation of Dust at Site 22
Future Residential Land Use Scenario

Analyte	Carcinogenic Intake (mg/kg/day)	Slope Factor 1/(mg/kg/day)	Risk
Antimony	--	--	--
Barium	--	--	--
Beryllium	1.86E-10	8.4E+00	2E-09
Cadmium	1.90E-09	6.3E+00	1E-08
Copper	--	--	--
Lead	--	--	--
Mercury	--	--	--
Potassium	--	--	--
Silver	--	--	--
Thallium	--	--	--
Zinc	--	--	--
DDD	7.28E-12	--	--
DDE	9.33E-12	--	--
DDT	2.41E-11	3.4E-01	2E-12
Total			1E-08 (a)

Analyte	Noncarcinogenic Intake (mg/kg/day)	Reference Dose (mg/kg/day)	Hazard Quotient
Antimony	1.43E-08	**	**
Barium	5.49E-08	1.4E-04	4E-04
Beryllium	4.35E-10	**	**
Cadmium	4.44E-09	**	**
Copper	3.22E-07	**	**
Lead	4.26E-07	**	**
Mercury	7.44E-11	9.0E-05	8E-07
Potassium	6.62E-07	**	**
Silver	6.83E-11	**	**
Thallium	7.88E-09	**	**
Zinc	2.32E-07	**	**
DDD	1.70E-11	**	**
DDE	2.18E-11	**	**
DDT	5.62E-11	**	**
Total			4E-04 (a)

"--" - Not calculated because contaminant is not considered a carcinogen or potency factor is not available.

"**" - Reference dose is not available.

* - Replaces original Table 7-259 in the Final Baseline RA; Dames & Moore, 1992a.

(a) - Final Baseline RA results were a total carcinogenic risk of 3E-08 and a hazard index of 5E-04.

TABLE 7-260*

Potential Carcinogenic Risks and Noncarcinogenic Hazards Due to the Consumption of Crops at Site 22 Future Residential Land Use Scenario

Analyte	Carcinogenic Intake (mg/kg/day)	Slope Factor 1/(mg/kg/day)	Risk
Antimony	–	–	–
Barium	–	–	–
Beryllium	4.69E-07	4.3E+00	2E-06
Cadmium	–	–	–
Copper	–	–	–
Lead	–	–	–
Mercury	–	–	–
Potassium	–	–	–
Silver	–	–	–
Thallium	–	–	–
Zinc	–	–	–
DDD	4.34E-07	2.4E-01	1E-07
DDE	4.68E-07	3.4E-01	2E-07
DDT	4.95E-07	3.4E-01	2E-07
Total			2E-06 (a)

Analyte	Noncarcinogenic Intake (mg/kg/day)	Reference Dose (mg/kg/day)	Hazard Quotient
Antimony	xx	4.0E-04	xx
Barium	xx	7.0E-02	xx
Beryllium	1.09E-06	5.0E-03	2E-04
Cadmium	6.71E-04	1.0E-03	7E-01
Copper	xx	3.7E-02	xx
Lead	5.36E-03	**	**
Mercury	1.69E-05	3.0E-04	6E-02
Potassium	xx	**	**
Silver	xx	5.0E-03	xx
Thallium	xx	8.0E-05	xx
Zinc	xx	2.0E-01	xx
DDD	1.01E-06	**	**
DDE	1.09E-06	**	**
DDT	1.15E-06	5.0E-04	2E-03
Total			7E-01 (a)

"–" - Not calculated because contaminant is not considered a carcinogen or potency factor is not available.

"xx" - Quantitative information on uptake factors not available.

"**" - Reference dose is not available.

* - Replaces original Table 7-260 in the Final Baseline RA; Dames & Moore, 1992a.

(a) - Final Baseline RA results were a total carcinogenic risk of 1E-06 and a hazard index of 2.

TABLE 7-261*

Multiple Pathway Potential Carcinogenic Risks and Noncarcinogenic Hazards at Site 22 --Future Residential Land Use Scenario

Pathway No.	Pathway Description	Risk	Hazard Index
1	Dermal Absorption of Contaminants in Soil	NA	NA
2	Incidental Ingestion of Soil	7E-06	1E+00
3	Inhalation of Dust	1E-08	4E-04
5	Ingestion of Groundwater	NA	NA
6	Inhalation of Volatile Contaminants Emitted From Groundwater During Showering	NA	NA
7	Dermal Absorption of Groundwater Contaminants During Showering	NA	NA
12	Consumption of Crops	2E-06	7E-01
	Total	9E-06 (a)	2E+00 (a)

"NA" - Pathway not applicable to or quantified for site.

* - Replaces original Table 7-261 in the Final Baseline RA; Dames & Moore, 1992a.

(a) - Final Baseline RA results were a multiple pathway carcinogenic risk and a hazard index of 1E-06 and 3, respectively.

RA, the crop ingestion and soil ingestion pathways appear to present the greatest potential risk and hazard.

7.3.8.3 Site 44: Road Oil Application/Disposal Location II. Tables 7-265A through 7-265C present the estimated noncarcinogenic intakes, reference doses, and potential hazards, as applicable, for incidental soil ingestion, dust inhalation, and crop ingestion (pathways 2, 3, and 12), respectively, for the future residential land use scenario as Site 44 Location II.

Because potency factors are not available for any of the soil contaminants of concern at Site 44 Location II, a carcinogenic risk is not calculated for the soil ingestion, dust inhalation, or crop ingestion pathways. The total potential noncarcinogenic hazard for inadvertent ingestion of contaminated soil (pathway 2) is 5E-04. The total potential noncarcinogenic hazard for inhalation of contaminated soil soil as airborne dust (pathway 3) is not calculated, because inhalation reference doses are not available for the contaminants of concern. The total potential noncarcinogenic hazard for consumption of crops irrigated by contaminated groundwater or grown in contaminated soil (pathway 12) is not calculated, because oral reference doses and uptake are not available for the contaminants of concern. Because soil sampling was not previously performed, no Baseline RA results are available for the above pathways.

Table 7-265D presents the multiple pathway noncarcinogenic hazard for the future residential land use scenario at Site 44 Location II. A potential carcinogenic risk is not calculated, because potency factors are not available for any of the contaminants of concern. The total potential noncarcinogenic hazard is 5E-04. Because soil sampling was not previously performed, no Baseline RA results are available for this site.

7.3.10* Operable Unit J: Miscellaneous UMDA Sites

7.3.10.1* Site 2: Storage Igloos. Tables 7-269A through 7-269C present the estimated carcinogenic intakes, noncarcinogenic intakes, potency factors, reference doses, potential risks, and potential hazards, as applicable, for incidental soil ingestion, dust

TABLE 7-265A

Potential Carcinogenic Risks and Noncarcinogenic Hazards Due to Incidental Ingestion of Soil at Site 44, Location II Future Residential Land Use Scenario

Analyte	Carcinogenic Intake (mg/kg/day)	Slope Factor 1/(mg/kg/day)	Risk	
Lead	–	–	–	
Silver	–	–	–	
Total			0E+00	(a)

Analyte	Noncarcinogenic Intake (mg/kg/day)	Reference Dose (mg/kg/day)	Hazard Quotient	
Lead	2.47E-05	**	**	
Silver	2.51E-06	5.0E-03	5E-04	
Total			5E-04	(a)

"–" - Not calculated because contaminant is not considered a carcinogen or potency factor is not available.

** - Reference dose is unavailable

(a) - Because no soil sampling was previously performed, no Final Baseline RA results are available.

TABLE 7-265B

Potential Carcinogenic Risks and Noncarcinogenic Hazards Due to Inhalation of Dust at Site 44, Location II Future Residential Land Use Scenario

Analyte	Carcinogenic Intake (mg/kg/day)	Slope Factor 1/(mg/kg/day)	Risk	
Lead	--	--	--	
Silver	--	--	--	
Total			0E+00	(a)

Analyte	Noncarcinogenic Intake (mg/kg/day)	Reference Dose (mg/kg/day)	Hazard Quotient	
Lead	9.60E-09	**	**	
Silver	9.75E-10	**	**	
Total			0E+00	(a)

"--" - Not calculated because contaminant is not considered a carcinogen or potency factor is not available.

"**" - Reference dose is not available.

(a) - Because no soil sampling was previously performed, no Final Baseline RA results are available.

TABLE 7-265C

Potential Carcinogenic Risks and Noncarcinogenic Hazards Due to the Consumption of Crops at Site 44, Location II Future Residential Land Use Scenario

Analyte	Carcinogenic Intake (mg/kg/day)	Slope Factor 1/(mg/kg/day)	Risk	
Lead	--	--	--	
Silver	--	--	--	
Total			0E+00	(a)

Analyte	Noncarcinogenic Intake (mg/kg/day)	Reference Dose (mg/kg/day)	Hazard Quotient	
Lead	3.70E-05	**	**	
Silver	xx	5.0E-03	xx	
Total			0E+00	(a)

"--" - Not calculated because contaminant is not considered a carcinogen or potency factor is not available.

"xx" - Quantitative information on uptake factors not available.

"**" - Reference dose is not available.

(a) - Because no soil sampling was previously performed, no Final Baseline RA results are available.

TABLE 7-265D

Multiple Pathway Potential Carcinogenic Risks and Noncarcinogenic Hazards at Site 44, Location II -- Future Residential Land Use Scenario

Pathway No.	Pathway Description	Risk		Hazard Index	
1	Dermal Absorption of Contaminants in Soil	NA		NA	
2	Incidental Ingestion of Soil	0E+00		5E-04	
3	Inhalation of Dust	0E+00		0E+00	
5	Ingestion of Groundwater	NA		NA	
6	Inhalation of Volatile Contaminants Emitted From Groundwater During Showering	NA		NA	
7	Dermal Absorption of Groundwater Contaminants During Showering	NA		NA	
12	Consumption of Crops	0E+00		0E+00	
	Total	0E+00	(a)	5E-04	(a)

"NA" - Pathway not applicable to or quantified for site.

(a) - Because no soil sampling was previously performed, no Final Baseline RA results are available.

TABLE 7-269A

Potential Carcinogenic Risks and Noncarcinogenic Hazards Due to Incidental Ingestion of Soil Between Storage Igloos H1641 and H1642 at Site 2 Future Residential Land Use Scenario

Analyte	Carcinogenic Intake (mg/kg/day)	Slope Factor 1/(mg/kg/day)	Risk	
Chromium	--	--	--	
Lead	--	--	--	
Zinc	--	--	--	
Total			0E+00	(a)

Analyte	Noncarcinogenic Intake (mg/kg/day)	Reference Dose (mg/kg/day)	Hazard Quotient	
Chromium	9.21E-04	5.0E-03	2E-01	
Lead	6.21E-03	**	**	
Zinc	1.50E-03	2.0E-01	8E-03	
Total			2E-01	(a)

"--" - Not calculated because contaminant is not considered a carcinogen or potency factor is not available.

"**" - Reference dose is not available.

(a) - Because no soil sampling was previously performed, no Final Baseline RA results are available.

TABLE 7-269B

Potential Carcinogenic Risks and Noncarcinogenic Hazards Due to Inhalation of Dust Between Storage Igloos H1641 and H1642 at Site 2 Future Residential Land Use Scenario

Analyte	Carcinogenic Intake (mg/kg/day)	Slope Factor 1/(mg/kg/day)	Risk	
Chromium	2.16E-08	4.2E+01	9E-07	
Lead	--	--	--	
Zinc	--	--	--	
Total			9E-07	(a)

Analyte	Noncarcinogenic Intake (mg/kg/day)	Reference Dose (mg/kg/day)	Hazard Quotient	
Chromium	5.05E-08	6.0E-07	8E-02	
Lead	3.40E-07	**	**	
Zinc	8.23E-08	**	**	
Total			8E-02	(a)

"--" - Not calculated because contaminant is not considered a carcinogen or potency factor is not available.

"**" - Reference dose is not available.

(a) - Because no soil sampling was previously performed, no Final Baseline RA results are available.

TABLE 7-269C

Potential Carcinogenic Risks and Noncarcinogenic Hazards Due to the Consumption of Crops Between Storage Igloos H1641 and H1642 at Site 2 Future Residential Land Use Scenario

Analyte	Carcinogenic Intake (mg/kg/day)	Slope Factor 1/(mg/kg/day)	Risk	
Chromium	--	--	--	
Lead	--	--	--	
Zinc	--	--	--	
Total			0E+00	(a)

Analyte	Noncarcinogenic Intake (mg/kg/day)	Reference Dose (mg/kg/day)	Hazard Quotient	
Chromium	2.76E-04	5.0E-03	6E-02	
Lead	9.32E-03	**	**	
Zinc	xx	2.0E-01	xx	
Total			6E-02	(a)

"--" - Not calculated because contaminant is not considered a carcinogen or potency factor is not available.

"xx" - Quantitative information on uptake factors not available.

"**" - Reference dose is not available.

(a) - Because no soil sampling was previously performed, no Final Baseline RA results are available.

inhalation, and crop ingestion (pathways 2, 3, and 12), respectively, for the future residential land use scenario at followup fieldwork Site 2 (between storage igloo blocks H1641 and H1642).

The total potential noncarcinogenic hazard for inadvertent ingestion of contaminated soil (pathway 2) is 2E-01. The total potential carcinogenic risk for soil ingestion is not calculated, because the contaminants of concern are not considered to be carcinogens via oral pathways. The total potential carcinogenic risk and noncarcinogenic hazard for inhalation of contaminated soil as airborne dust (pathway 3) are 9E-07 and 8E-02, respectively. The total potential carcinogenic risk for consumption of crops irrigated by contaminated groundwater or grown in contaminated soil (pathway 12) is not calculated, because the contaminants of concern are not considered to be carcinogens via oral pathways. The total potential noncarcinogenic hazard for consumption of crops is 6E-02. Because no sampling was previously performed, no Baseline RA results are available for the above pathways.

Table 7-269D presents the multiple pathway potential carcinogenic risk and noncarcinogenic hazard for the future residential land use scenario at Site 2, between storage igloo blocks H1641 and H1642. The total potential carcinogenic risk is 9E-07, and the total potential noncarcinogenic hazard is 3E-01. Because no sampling was previously performed, no Baseline RA results are available for this site.

7.4* EVALUATION OF EXPOSURE TO LEAD

The EPA UBK model used to assess potential exposure to lead at UMDA sites is discussed in detail in Section 7.4.1 of the Baseline RA.

7.4.2 Application of the Uptake/Biokinetic Model to Selected UMDA Sites

Sites selected for application of the UBK model include all UMDA sites where lead was detected in soil at a concentration greater than 200 ppm. A review of the occurrence and distribution tables presented in Section 3.0 of the Baseline RA and Section 3.0* of the addendum indicates that 15 sites--Sites 1, 13, 14, 32 (Location II), 37, 39, and 46, and followup fieldwork Sites 2, 15, 17, 18, 19, 22, 26, and 47--meet this

TABLE 7-269D

Multiple Pathway Potential Carcinogenic Risks and Noncarcinogenic Hazards Between Storage Igloos H1641 and H1642 at Site 2 Future Residential Land Use Scenario

Pathway No.	Pathway Description	Risk		Hazard Index	
1	Dermal Absorption of Contaminants in Soil	NA		NA	
2	Incidental Ingestion of Soil	0E+00		2E-01	
3	Inhalation of Dust	9E-07		8E-02	
5	Ingestion of Groundwater	NA		NA	
6	Inhalation of Volatile Contaminants Emitted From Groundwater During Showering	NA		NA	
7	Dermal Absorption of Groundwater Contaminants During Showering	NA		NA	
12	Consumption of Crops	0E+00		6E-02	
	Total	9E-07	(a)	3E-01	(a)

"NA" - Pathway not applicable to or quantified for site.

(a) - Because no soil sampling was previously performed, no Final Baseline RA results are available.

criterion. These 15 sites are listed in Table 7-290.* At 200 mg/kg, using the default values, more than 99.9 percent of children 0 to 6 years of age would have blood lead levels of less than or equal to 10 μg/dL. A blood lead level of 10 μg/dL is the lower end of the range (10 to 15 μg/dL) identified by the CDC (1991) as that where effects may be seen in some of the population. EPA (1986) and CDC (1991) summarize the relationship between lead blood concentrations and adverse health effects in children. In general, the observed effects (particularly neurological toxicity) occur at much lower blood lead concentrations in exposed children than in adults.

The inhibition of erythrocyte amino leuvinilic acid (ALA) dehydratase, which is apparently a reversible effect, occurs at blood lead levels less than 10 μg/dL. At 10 to 30 μg/dL, and possibly lower, lead is associated with subtle deficiencies in intelligence quotient (IQ) scores, attention span, social development, and electroencephalographic data. Although individual studies are sometimes flawed, the overall weight of evidence from multiple childhood studies strongly supports the concept that irreversible neurological damage can occur in the range of 10 to 15 μg/dL. Erythrocyte protoporphyrin levels, diagnostic of the failure to take up iron during heme formation, also become elevated at these blood levels.

At 40 μg/dL, and possibly lower, elevated blood and urinary ALA levels, and reduced hemoglobin concentration--both indicative of significantly impaired hematopoiesis--are observed in children. Because of the putative accumulation of ALA in brain tissue, neurological damage becomes more severe. Neurotoxicity at blood concentrations of 40 to 60 μg/dL includes reductions in nerve conduction velocities and peripheral neuropathies. Impairment of vitamin D metabolism is severe at blood lead levels of 30 to 50 μg/dL. This impairment results in altered calcium homeostasis, with probable adverse effects on mineral metabolism, immunoregulation, and susceptibility to tumor induction.

At 70 to 100 μg/dL, lead induces a severe anemia, chronic nephropathy, colic, and other gastrointestinal symptoms. The nephropathy is characterized by aminoaciduria, or the abnormal discharge of protein precursors into the urine.

TABLE 7-290*

Results of the Uptake/Biokinetic Model for Lead at Selected UMDA Sites

	Site No.	Concentration in Groundwater (ug/l)(a)	Concentration in Soil (mg/kg)(b)	Mean Blood Lead Concentration (ug/dl)(c)	Cutoff of 10 ug/dl % Below	Cutoff of 10 ug/dl % Above	Cutoff of 15 ug/dl % Below	Cutoff of 15 ug/dl % Above
**	**47**	**5.84 (floodgravel)**	**428**	**5.29**	**96.65**	**3.35**	**99.86**	**0.14**
		3.04 (basalt)		5.11	97.49	2.51	99.90	0.1
	13	4.53	321	4.3	99.26	0.74	99.98	0.02
	14	1.38	330	4.16	99.41	0.59	99.99	0.01
**	**15**	**ND (d)**	**401**	**7.45**	**97.98**	**2.02**	**99.93**	**0.07**
**	**17**	**NA (d)**	**837**	**8.66**	**67.32**	**32.68**	**94.48**	**5.52**
**	**18**	**1.41**	**250**	**3.48**	**99.88**	**0.12**	**100**	**0**
**	**19**	**9.53**	**1225**	**12.35**	**29.37**	**70.63**	**72.63**	**27.37**
	32 Loc II	NA (d)	1263	12.3	29.37	70.63	72.63	27.37
	1	NA (d)	2618	23.95	0.96	99.04	11.37	88.63
**	**26**	**NA (d)**	**469**	**5.52**	**95.85**	**4.15**	**99.8**	**0.2**
	37	NA (d)	355	4.55	98.86	1.14	99.97	0.03
	46	NA (d)	201	3.24	99.94	0.06	100	0
**	**22**	**NA (d)**	**979**	**9.87**	**54.62**	**45.38**	**88.93**	**11.07**
	39	NA (d)	288	3.98	99.62	0.38	99.99	0.01
**	**2**	**NA (d)**	**1700**	**16.05**	**11.37**	**88.63**	**44.85**	**55.15**

(a) - The groundwater concentration is the 95 percent upper confidence limit on the arithmetic mean of groundwater data. Non-detects are replaced with one-half the detection level.
(b) - The soil concentration is the 95 percent upper confidence limit on the arithmetic mean of surface soil data (samples less than 2 feet deep). Non-detects are replaced with one-half the detection level.
(c) - The mean blood lead concentration presented is the geometric mean.
(d) - The program default value of 4.0 ug/l of lead in groundwater is used in the UBK model.
(e) - Only sites with soil concentrations of lead equal to or greater than 200 mg/kg were evaluated using the uptake/biokinetic model.
NA - Not analyzed
ND - Not detected
* - Replaces Table 7-290 in the Baseline RA, Dames & Moore, 1992a.
**** - Site at which followup fieldwork was performed.**

Encephalopathy, or organic brain damage, is first observed at concentrations of 80 to 100 μg/dL blood lead.

The UBK model was run using the program default parameters provided in Section 7.4.1 of the Baseline RA, except for the soil/dust concentrations and groundwater concentrations, which are site-specific. The site-specific soil and groundwater concentrations are calculated as described in Section 6.4 of the Baseline RA and are presented in Table 7-290*. In the absence of site-specific groundwater data, the program default value of 4 μg/L is used. The dust concentration is assumed to equal the site-specific soil concentration, and a constant dust concentration is used. The default air concentration of 0.20 microgram per cubic meter ($\mu g/m^3$) is used in lieu of site-specific modeled air concentrations, because modeled air concentrations based on current soil lead concentrations may not represent conditions under a future residential scenario.

Table 7-290* presents the results of the UBK model for all UMDA sites evaluated. The geometric mean blood lead concentration and percentage of the population below and above the cutoffs of 10 μg/dL and 15μg/dL are presented. Figures 7-1* and 7-2* are examples of the model output for followup fieldwork Site 15; they show the bell-shaped probability density function using cutoffs of 10 and 15 μg/dL, respectively. The results presented in Table 7-290* indicate that several UMDA sites have lead concentrations that may result in unacceptable exposure levels; the determination of unacceptable exposure levels is dependent on how much of the population you want to protect and the blood lead cutoff selected. For example, at six sites (Sites 1 and 32 (Location II), and followup fieldwork Sites 2, 17, 19, and 22), less than 95 percent of the population is predicted to have a blood lead level below 10 μg/L or below 15 μg/dL. If the degree of protectiveness selected is 99 percent of the population, 10 sites (Sites 1, 32 (Location II), and 37, and followup fieldwork Sites 2, 15, 17, 19, 22, 26, and 47) are predicted to have less than 99 percent of the population below a blood lead level of 10 μg/dL; and six sites (Sites 1 and 32 (Location II), and followup fieldwork Sites 2, 17, 19, and 22) are predicted to have less than 99 percent of the population below a blood lead level of 15 μg/dL.

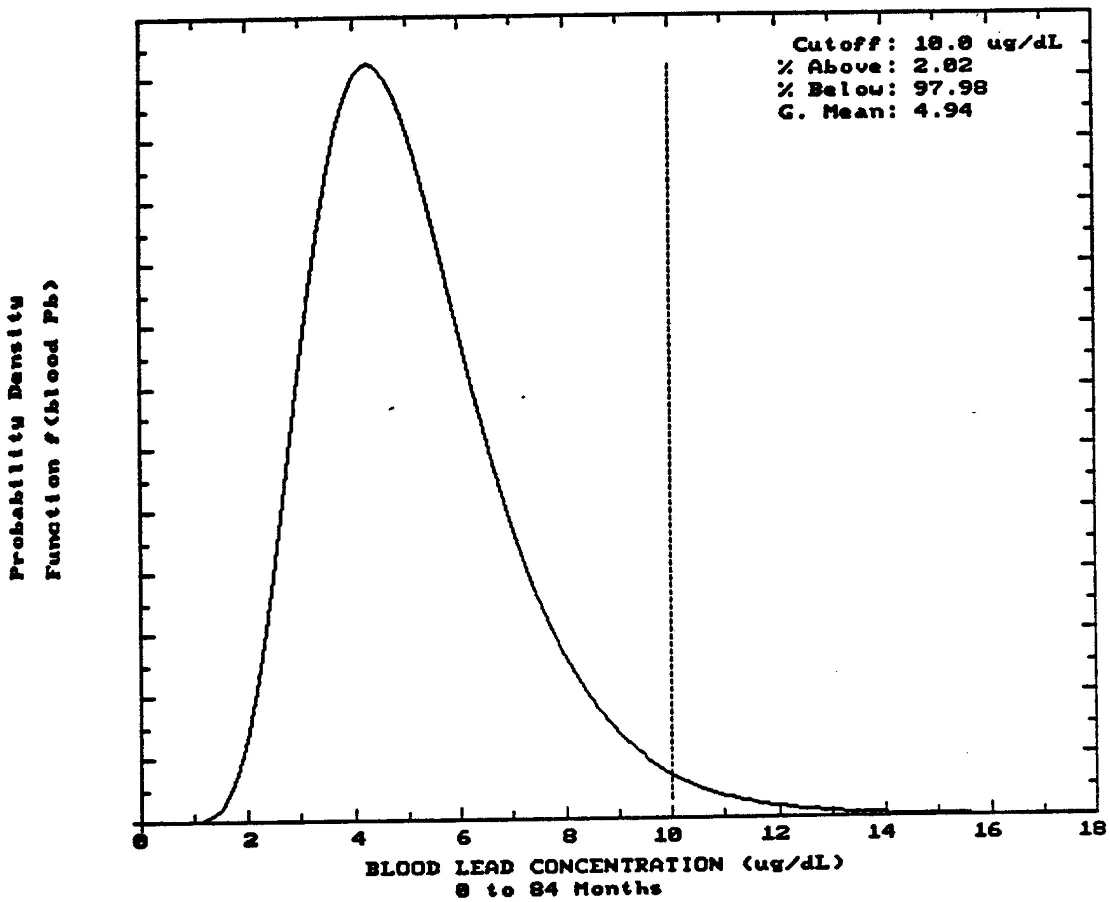

FIGURE 7–1*
BELL-SHAPED PROBABILITY DENSITY FUNCTION
FOR SITE 15
USING A CUTOFF OF 10 µg/dl BLOOD LEAD

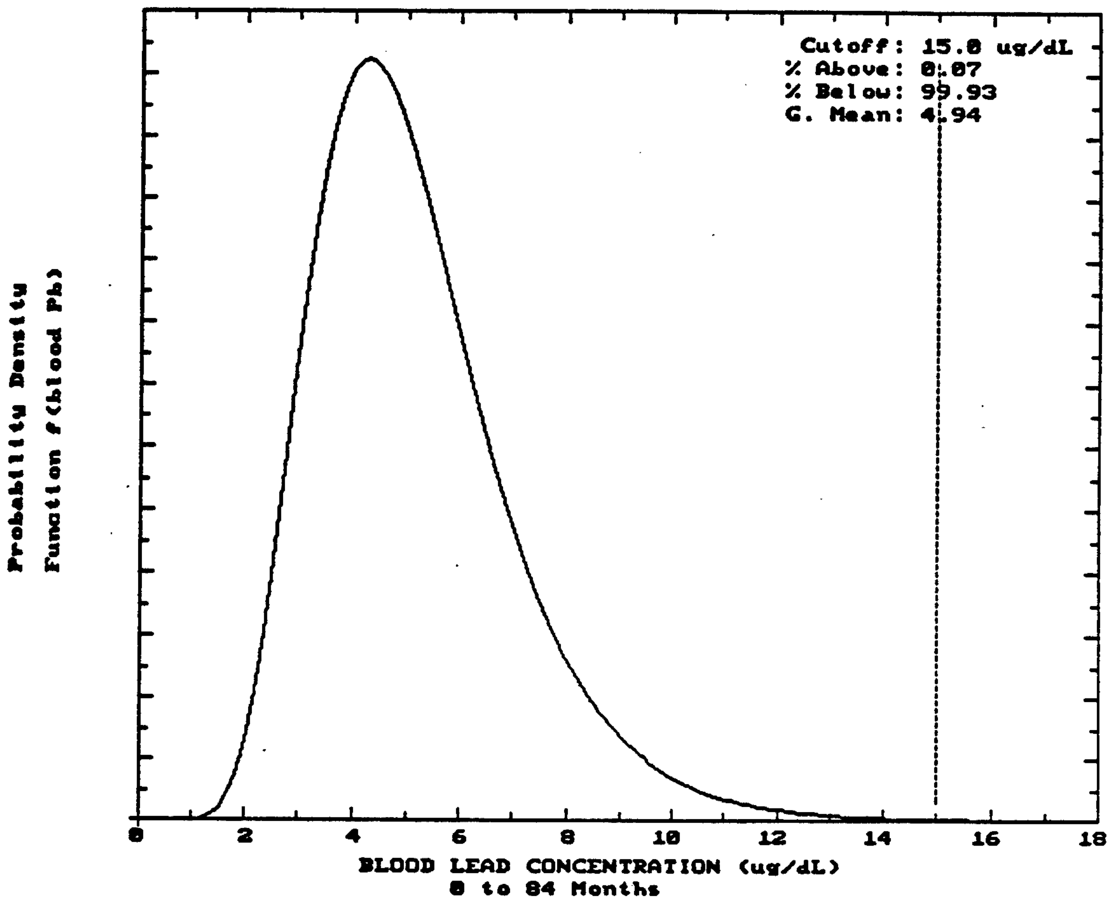

FIGURE 7–2*
BELL-SHAPED PROBABILITY DENSITY FUNCTION
FOR SITE 15
USING A CUTOFF OF 15 μg/dl BLOOD LEAD

In general, with the addition of the followup fieldwork results, predictions based on the UBK model for followup fieldwork Sites 15, 17, 18, 19, 22, 26, and 47 were unchanged or more protective than those calculated in the Baseline RA (Dames & Moore, 1992a), primarily because the exposure point concentrations of lead were lower. Site 2 soil was not sampled previously; therefore, no UBK model results were presented for this site in the Baseline RA.

7.5* EVALUATION OF UNCERTAINTIES IN THE BASELINE RISK ASSESSMENT

The majority of the uncertainties discussed in the Baseline RA do not change as a result of the additional field investigation. Those uncertainties that are affected by the followup fieldwork are discussed below.

7.5.1* Uncertainties Associated With Definition of the Physical Setting

7.5.1.2* Future Land Uses. One of the main uncertainties concerning the future land uses identified in the Baseline RA is the likelihood of their actual occurrence at UMDA. For example, though residential development of the ADA Area is quantitatively evaluated, such development is unlikely given the high probability that unexploded ordnance exists throughout the area (see Section 6.1.2.1 of the Baseline RA). Unrestricted future land uses (agricultural, recreational, industrial) in the ADA Area are not likely to occur unless the area is fully remediated. This is especially important to consider, because risks and hazards estimated for future residents in the ADA Area are some of the highest calculated for the Baseline RA (e.g., the total multipathway risk and hazard estimated for future residents at followup fieldwork Site 19 are 3E-01 and 7E+04, respectively).

7.5.6* Uncertainties Associated With Toxicity Information

7.5.6.3* Uncertainties Associated With Inhalation Toxicity Criteria

7.5.6.3.1* Lack of Inhalation Toxicity Criteria for All Contaminants of Concern for Inhalation-Related Pathways. Inhalation toxicity criteria are not available for all contaminants of concern for inhalation-related pathways. To evaluate uncertainties

associated with this data gap, the risks for pathway 3 (inhalation of contaminated soil as airborne dust) are re-evaluated for certain receptors using oral-based toxicity criteria for chemicals for which there are no inhalation criteria. Tables 7-292*, 7-293*, and 7-294* present the results of this re-evaluation for current eastern boundary residents, future residents at followup fieldwork Site 5, and future residents at followup fieldwork Site 47, respectively.

Oral-based toxicity criteria are not used in the Baseline RA for estimation of risks from inhalation exposure for several reasons. First, many contaminants show portal-of-entry toxicity; that is, adverse health effects occur principally at the tissue site at which the chemical is introduced into the body (e.g., gastrointestinal tract, lung, or skin). For example, orally administered benzo[a]pyrene is associated with benign and malignant tumors in the gut mucosa (Neal and Rigdon, 1967), but inhaled benzo[a]pyrene produces an increased incidence of upper respiratory tract tumors (Thyssen et al., 1981). Quantitative risk estimates based on these two administration routes would be different.

Second, physiological and anatomical differences between the gastrointestinal tract and respiratory systems invalidate a cross-route quantitative risk extrapolation. The small intestine of humans contains a very large surface area that readily absorbs most compounds by passive diffusion (Klaasen, 1986). The oral absorption of a few compounds, such as iron, is an energy-dependent (active-transport) process wherein the absorption rate is proportional to the body's current need for iron. The rate and extent of pulmonary absorption are much more complex and depend on such factors as the particle size distribution of the airborne toxicant and the blood:gas solubility of the toxicant (Klaasen, 1986). Only particles with median aerodynamic diameters of approximately 1 micrometer or less are absorbed by the alveolar region of the human lung. Larger particles deposit in the tracheobronchial or nasopharyngeal regions, where they are either cleared by mucociliary mechanisms and subsequently swallowed, or physically removed and exhaled. Pulmonary absorption is, therefore, more highly dependent on the physicochemical properties of the material than oral absorption. Highly lipid-soluble gases (e.g., chloroform) are more rapidly absorbed

TABLE 7-292*

Potential Carcinogenic Risks and Noncarcinogenic Hazards Due to Inhalation of Dust Using Inhalation and Oral Toxicity Criteria Current Land Use Scenario, Eastern Boundary Residents (a)

Analyte	Carcinogenic Intake (mg/kg/day)	Slope Factor 1/(mg/kg/day)	Risk
Aluminum	--	--	--
Antimony	--	--	--
Arsenic	1.77E-10	1.4E+01	2E-09
Barium	--	--	--
Beryllium	7.43E-13	8.4E+00	6E-12
Cadmium	1.11E-09	6.3E+00	7E-09
Calcium	--	--	--
Chromium	4.60E-10	4.2E+01	2E-08
Cobalt	--	--	--
Copper	--	--	--
Cyanide	--	--	--
Iron	--	--	--
Lead	--	--	--
Magnesium	--	--	--
Manganese	--	--	--
Mercury	--	--	--
Nickel	3.60E-10	1.7E+00	6E-10
Potassium	--	--	--
Selenium	--	--	--
Silver	--	--	--
Sodium	--	--	--
Thallium	--	--	--
Zinc	--	--	--
1,1,1-Trichloroethane	--	--	--
135TNB	--	--	--
13DNB	--	--	--
246TNT	2.89E-08	3.0E-02 (b)	9E-10
24DNT	9.13E-12	6.8E-01 (b)	6E-12
26DNT	9.51E-13	6.8E-01 (b)	6E-13
HMX	--	--	--
RDX	4.23E-10	1.1E-01 (b)	5E-11
Nitrobenzene	--	--	--
Tetryl	--	--	--
Nitrate/nitrite	--	--	--
Benzo(a)anthracene	7.54E-14	6.1E+00	5E-13
Benzo(b)fluoranthene	1.36E-13	6.1E+00	8E-13
Benzo(k)fluoranthene	6.97E-14	6.1E+00	4E-13
Chrysene	1.46E-13	6.1E+00	9E-13
Di-n-butyl phthalate	--	--	--
Fluoranthene	--	--	--
Napthalene	--	--	--
Phenanthrene	--	--	--
Pyrene	--	--	--
Chlordane	9.18E-14	1.3E+00	1E-13
Dieldrin	2.74E-13	1.6E+01	4E-12
DDD	3.25E-13	2.4E-01 (b)	8E-14
DDE	1.70E-12	3.4E-01 (b)	6E-13
DDT	1.41E-12	3.4E-01	5E-13
PCB 1260	1.02E-13	7.7E+00 (b)	8E-13
Total			3E-08

TABLE 7–292* (cont'd)

Potential Carcinogenic Risks and Noncarcinogenic Hazards Due to Inhalation of Dust Using Inhalation and Oral Toxicity Criteria Current Land Use Scenario, Eastern Boundary Residents (a)

Analyte	Noncarcinogenic Intake (mg/kg/day)	Reference Dose (mg/kg/day)	Hazard Quotient
Aluminum	9.90E–08	2.9E+00 (b)	3E–08
Antimony	4.86E–09	4.0E–04 (b)	1E–05
Arsenic	4.12E–10	**	**
Barium	2.06E–07	1.4E–04	1E–03
Beryllium	1.73E–12	5.0E–03 (b)	3E–10
Cadmium	2.60E–09	5.0E–04 (b)	5E–06
Calcium	5.18E–08	**	**
Chromium	1.07E–09	6.0E–07	2E–03
Cobalt	7.24E–09	2.9E–04	3E–05
Copper	2.45E–07	**	**
Cyanide	4.33E–10	2.0E–02 (b)	2E–08
Iron	7.15E–07	**	**
Lead	1.21E–08	**	**
Magnesium	1.44E–08	**	**
Manganese	2.51E–09	1.0E–04	3E–05
Mercury	1.81E–11	9.0E–05	2E–07
Nickel	8.41E–10	2.0E–02 (b)	4E–08
Potassium	9.60E–08	**	**
Selenium	8.25E–13	5.0E–03 (b)	2E–10
Silver	3.64E–09	5.0E–03 (b)	7E–07
Sodium	2.35E–07	**	**
Thallium	1.06E–10	8.0E–05 (b)	1E–06
Zinc	4.23E–07	2.0E–01 (b)	2E–06
1,1,1–Trichloroethane	1.45E–14	3.0E–01	5E–14
135TNB	3.38E–10	5.0E–05 (b)	7E–06
13DNB	1.94E–13	1.0E–04 (b)	2E–09
246TNT	6.75E–08	5.0E–04 (b)	1E–04
24DNT	2.13E–11	2.0E–03 (b)	1E–08
26DNT	2.22E–12	1.0E–03 (b)	2E–09
HMX	5.67E–11	5.0E–02 (b)	1E–09
RDX	9.87E–10	3.0E–03 (b)	3E–07
Nitrobenzene	1.57E–11	6.0E–04	3E–08
Tetryl	2.91E–11	1.0E–02 (b)	3E–09
Nitrate/nitrite	6.56E–09	1.6E+00 (b)	4E–09
Benzo(a)anthracene	1.76E–13	**	**
Benzo(b)fluoranthene	3.17E–13	**	**
Benzo(k)fluoranthene	1.63E–13	**	**
Chrysene	3.40E–13	**	**
Di–n–butyl phthalate	8.80E–13	1.0E–01 (b)	9E–12
Fluoranthene	2.08E–13	4.0E–02 (b)	5E–12
Napthalene	3.89E–13	4.0E–03 (b)	1E–10
Phenanthrene	3.60E–12	**	**
Pyrene	2.30E–13	3.0E–02 (b)	8E–12
Chlordane	2.14E–13	6.0E–05 (b)	4E–09
Dieldrin	6.39E–13	5.0E–05 (b)	1E–08
DDD	7.58E–13	**	**
DDE	3.97E–12	**	**
DDT	3.29E–12	5.0E–04 (b)	7E–09
PCB 1260	2.38E–13	**	**
Total			3E–03

"– –" – Not calculated because contaminant is not considered a carcinogen or potency factor is not available.

"**" – Reference dose is not available.

(a) The following sites were included in calculating intakes, risks, and hazards for this receptor: Sites 16, 57 III, 21, 38, 52, 31, 60, 19, 9, 10, 39, 18, 26, 57 II, 81 I, 57 I, 67, 4, 47, 25 I, 5, 15.

* – Replaces original Table 7–292 in the Final Baseline RA; Dames & Moore, 1992a.

TABLE 7-293*

Potential Carcinogenic Risks and Noncarcinogenic Hazards Due to Inhalation of Dust at Site 5 Using Inhalation and Oral Toxicity Criteria Future Residential Land Use Scenario

Analyte	Carcinogenic Intake (mg/kg/day)	Potency Factor 1/(mg/kg/day)	Risk
135TNB	--	--	--
13DNB	--	--	--
246TNT	7.43E-08	3.00E-02 (a)	2E-09
24DNT	8.06E-11	6.80E-01 (a)	5E-11
HMX	--	--	--
RDX	1.62E-08	1.10E-01 (a)	2E-09
Nitrite/nitrate	--	--	--
Total			4E-09

Analyte	Noncarcinogenic Intake (mg/kg/day)	Reference Dose (mg/kg/day)	Hazard Quotient
135TNB	1.30E-09	5.00E-05 (a)	3E-05
13DNB	6.91E-11	1.00E-04 (a)	7E-07
246TNT	1.73E-07	5.00E-04 (a)	3E-04
24DNT	1.89E-10	6.00E-04 (a)	3E-07
HMX	4.03E-09	5.00E-02 (a)	8E-08
RDX	3.77E-08	3.00E-03 (a)	1E-05
Nitrite/nitrate	1.90E-09	1.60E+00 (a)	1E-09
Total			4E-04

"--" – Not calculated because contaminant is not considered a carcinogen or neither inhalation nor oral potency factor is available.

*** – Replaces original Table 7-293 in the final Baseline RA; Dames & Moore, 1992a.

(a) – No inhalation toxicity criteria available. Potency factor or reference dose is based on oral intake, not inhalation.

TABLE 7-294*

Potential Carcinogenic Risks and Noncarcinogenic Hazards Due to Inhalation of Dust at Site 47 Using Inhalation and Oral Toxicity Criteria Future Residential Land Use Scenario

Analyte	Carcinogenic Intake (mg/kg/day)	Potency Factor 1/(mg/kg/day)	Risk
Antimony	--	--	--
Barium	--	--	--
Cadmium	2.30E-09	6.3E+00	1E-08
Calcium	--	--	--
Chromium	3.94E-09	4.2E+01	2E-07
Copper	--	--	--
Lead	--	--	--
Magnesium	--	--	--
Mercury	--	--	--
Nickel	4.64E-09	1.7E+00	8E-09
Selenium	--	--	--
Silver	--	--	--
Sodium	--	--	--
Zinc	--	--	--
Nitrite/nitrate	--	--	--
Benzo(a)anthracene	2.45E-11	6.1E+00	1E-10
Benzo(b)fluoranthene	4.42E-11	6.1E+00	3E-10
Benzo(k)fluoranthene	2.27E-11	6.1E+00	1E-10
Chrysene	4.74E-11	6.1E+00	3E-10
Di-n-butyl phthalate	--	--	--
Fluoranthene	--	--	--
Phenanthrene	--	--	--
Pyrene	--	--	--
Chlordane	2.98E-11	1.3E+00	4E-11
DDD	1.73E-11	2.4E-01 (a)	4E-12
DDE	6.90E-13	3.4E-01 (a)	2E-13
DDT	6.60E-12	3.4E-01	2E-12
Dieldrin	6.90E-13	1.6E+01	1E-11
PCB-1260	3.14E-11	7.7E+00 (a)	2E-10
Total			2E-07

Analyte	Noncarcinogenic Intake (mg/kg/day)	Reference Dose (mg/kg/day)	Hazard Quotient
Antimony	3.47E-08	4.0E-04 (a)	9E-05
Barium	1.08E-07	1.4E-04	8E-04
Cadmium	5.36E-09	5.0E-04 (a)	1E-05
Calcium	1.68E-05	**	**
Chromium	9.19E-09	6.0E-07	2E-02
Copper	6.07E-08	3.0E-03	2E-05
Lead	9.84E-08	4.3E-04	2E-04
Magnesium	3.67E-06	8.6E-03	4E-04
Mercury	1.28E-10	1.0E-04	1E-06
Nickel	1.08E-08	2.0E-02 (a)	5E-07
Selenium	6.00E-11	5.0E-03 (a)	1E-08
Silver	1.47E-10	3.0E-03 (a)	5E-08
Sodium	2.13E-07	**	**
Zinc	2.21E-07	2.0E-01 (a)	1E-06
Nitrite/nitrate	4.28E-09	1.6E+00 (a)	3E-09
Benzo(a)anthracene	5.72E-11	**	**
Benzo(b)fluoranthene	1.03E-10	**	**
Benzo(k)fluoranthene	5.29E-11	**	**
Chrysene	1.11E-10	**	**
Di-n-butyl phthalate	1.87E-10	1.0E-01 (a)	2E-09
Fluoranthene	6.76E-11	4.0E-02 (a)	2E-09
Phenanthrene	2.14E-11	**	**
Pyrene	7.47E-11	3.0E-02 (a)	2E-09
Chlordane	6.96E-11	6.0E-05 (a)	1E-06
DDD	4.05E-11	**	**
DDE	1.61E-12	**	**
DDT	1.54E-11	5.0E-04 (a)	3E-08
Dieldrin	1.61E-12	5.0E-05 (a)	3E-08
PCB-1260	7.33E-11	**	**
Total			2E-02

"--" – Not calculated because contaminant is not considered a carcinogen or neither inhalation nor oral potency factor is available.
"*" – Replaces the original Table 7-294 in the Final Baseline RA; Dames & Moore, 1992a.
"**" – Neither inhalation nor oral reference dose is available.
(a) – No inhalation toxicity criteria available. Potency factor or reference dose is based on oral intake, not inhalation.

into the blood than poorly lipid-soluble gases (e.g., ethylene). For this reason, highly lipid-soluble gases take much longer to reach equilibrium in the blood. Thus, the inhalation absorption rate of a gas is more dependent on blood solubility than the oral absorption rate of the same substance administered as a liquid.

Finally, human inhalation risk estimates based on oral toxicity data in subhuman species are distorted by both route-to-route extrapolation and interspecies extrapolation. For example, the rodent gastrointestinal tract, which includes a structurally unique forestomach, is anatomically and functionally distinct from the human lung, which contains a very large alveolar surface area for extensive absorption. The rate and extent of absorption across these distinct physiological systems are very different.

The inhalation of dust by current eastern boundary residents is re-evaluated because of the large number of contaminants of concern with oral toxicity criteria, but no inhalation toxicity criteria (Table 7-21*). As presented in Table 7-292*, risk and hazard values do not change when oral toxicity criteria are used. Assuming that inhalation toxicity criteria are the same as the oral toxicity criteria used in Table 7-292*, these results indicate that contaminants not quantitatively evaluated in Table 7-21* would not significantly contribute to risks and hazards for this receptor via pathway 3.

Followup fieldwork Site 5 is selected to evaluate this uncertainty, because inhalation toxicity criteria are not available for any of the contaminants of concern, but several of the contaminants have oral toxicity criteria (Table 7-37*). As presented in Table 7-293*, the use of these oral toxicity criteria yields risks and hazards that are several orders of magnitude below 1E-06 and 1, respectively. Therefore, sites evaluated via pathway 3 that yield no risks from lack of inhalation toxicity criteria are not expected to yield significant risks or hazards even if oral toxicity criteria are used.

Followup fieldwork Site 47 is also selected to evaluate this uncertainty, because the total carcinogenic risk estimated for future residents using inhalation criteria alone is 2E-07, which is close to 1E-06. The inclusion of oral toxicity criteria for those

contaminants lacking inhalation toxicity criteria yields no change in total risk estimates (Table 7-294*).

8.0* PRELIMINARY REMEDIATION GOALS

The methodology used to develop PRGs for soil and groundwater is described in detail in Section 8.1 of the Baseline RA. No PRGs are developed for the current land use scenario, because the potential carcinogenic risks and noncarcinogenic hazards for all receptors are below 1E-06 and 1, respectively.

8.3* FUTURE LAND USE

Tables 8-1 through 8-5, 8-6* through 8-15*, 8-16 through 8-23, and 8-24* through 8-26* (tables with asterisks appear at the end of Section 8.0*) present PRGs for all major applicable future land use scenarios (i.e., residential, light industrial, military, construction, agricultural, and recreational) for the comprehensive suite of pathways evaluated for Site 31 (i.e., pathways 1, 2, 3, 5, 6, 7, 8, 10, 11, and 12; see Section 6.3.2.2 of the Baseline RA). The calculation of PRGs for a variety of land uses provides a range of remediation goals and land use scenarios for consideration when selecting remedial action criteria. Because pathway 3 (inhalation of contaminated soil as airborne dust) is dependent on the site-specific dust concentration, the maximum site dust concentration for each land use scenario is used in calculating PRGs for pathway 3 (i.e., 0.011 milligram per cubic meter (mg/m^3) for residential and agricultural land uses and 0.826 mg/m^3 for light industrial, military, and construction land uses).

Tables with asterisks include PRGs for the four new contaminants of concern based on followup fieldwork results--1,1,1-trichloroethane (previously a contaminant of concern only in subsurface soil, now also a contaminant of concern in surface soil), benzo(a)pyrene, benzo(g,h,i)perylene, and indeno(1,2,3-cd)pyrene. All other PRGs presented in the tables with asterisks are the same as those listed in corresponding Baseline RA tables.

A review of these tables indicates that the crop ingestion pathway (pathway 12) for the future residential land use scenario generally results in the lowest PRGs. However, because of the large uncertainties associated with pathway 12 (see Section

7.4.4.5 of the Baseline RA), management decisions based on the results of this pathway should be withheld until further data become available to document its legitimacy--for example, data from "pilot" crop growing, whereby crops are grown in contaminated UMDA soil, irrigated with contaminated groundwater, and then sampled and analyzed.

Because PRGs are developed for more than one pathway per receptor, single pathway PRGs are used in Equation 8-1 (Rosenblatt, 1981) of the Baseline RA to derive combined PRGs (CPRGs) to account for possible exposure via multiple pathways.

Tables 8-27*, 8-28, 8-29*, 8-30, 8-31*, 8-32, 8-33*, 8-34, 8-35*, and 8-36* present CPRGs that account for possible multiple exposures to contaminants of concern in the same medium by different exposure pathways for the same receptor. The CPRGs for the future residential land use scenario presented in Tables 8-27* and 8-28 include the beef/milk and crop ingestion pathways (pathways 11 and 12), for which there are large uncertainties (see Sections 7.4.4.4 and 7.4.4.5 of the Baseline RA). In addition, pathways 11 and 12 may apply only to farm families and not to nonfarming residential families. Therefore, CPRGs are presented in Tables 8-29* and 8-30 for a separate residential scenario that does not include consumption of contaminated beef, milk, and crops.

Because agricultural receptors are potentially exposed via only one groundwater pathway (dermal absorption of contaminants in groundwater) and recreational receptors are potentially exposed via only one pathway (consumption of game), the single pathway PRGs are applicable and are summarized in Tables 8-37 and 8-38*. Table 8-39* presents CPRGs for a worst case situation, assuming a future residential land use scenario where residents also hunt.

8.4* PRGs FOR LEAD

As discussed in Section 7.1 of the Baseline RA, the UBK model for lead is used to estimate total lead uptake (μg/day) in children (0 to 6 years old) and to predict a corresponding blood lead level (μg/dL). The model is used in this section to develop

PRGs for lead. It should be noted that because this model only calculates lead uptake for children, the PRGs developed for lead apply to the residential land use scenario only. EPA (1988c) identifies blood lead concentrations of 10 to 15 $\mu g/dL$ as levels of concern for adverse effects (see Appendix D of the Baseline RA). Therefore, these levels are used as the basis for developing PRGs for lead. Currently, to develop soil lead cleanup levels at Superfund sites, EPA recommends using a UBK model projection benchmark of 95 percent of the sensitive population with blood lead levels below 10 $\mu g/dL$ (USEPA, 1991n).

The UBK model was run using the default values discussed in Section 7.4.1 of the Baseline RA, a lead groundwater concentration of 10 $\mu g/L$, and a varying soil concentration. A concentration of 10 $\mu g/L$ in groundwater was selected as the target PRG for lead, because lead groundwater concentrations at all UMDA sites are below 10 $\mu g/L$. Therefore, it may not be necessary to consider remedial alternatives for lead in groundwater. A close evaluation of the UBK model indicates that the output is mainly a function of soil concentration; alteration of the target PRG for groundwater (10 $\mu g/L$) does not significantly impact the soil PRG.

Based on application of the UBK model, two potential PRGs for lead in UMDA soil are identified--200 and 500 mg/kg total lead. Figure 8-1 of the Baseline RA presents a graph of the bell-shaped probability density function at a soil concentration of 200 mg/kg lead. At this soil concentration, the model estimates protectiveness of 99.8 percent of children in a residential setting (i.e., at 200 mg/kg lead, more than 99.8 percent of an exposed sensitive population (young children) is expected to have blood lead levels of less than or equal to 10 $\mu g/dL$). A review of the occurrence and distribution tables presented in Section 3.0 of the Baseline RA and Section 3.0* of the addendum indicates that 15 sites (Sites 1, 13, 14, 32 Location II, 37, 39, and 46, and followup fieldwork Sites 2, 15, 17, 18, 19, 22, 26, and 47) have lead soil concentrations that exceed 200 mg/kg, indicating that they may potentially require consideration of remedial alternatives if a lead PRG of 200 mg/kg is selected.

Figures 8-2 and 8-3 of the Baseline RA present graphs of the bell-shaped probability density function at a soil concentration of 500 mg/kg lead, using cutoffs of 10- and 15-μg/dL blood lead levels, respectively. At this soil concentration, the model predicts that more than 92 percent of the children are expected to have blood lead levels of less than or equal to 10 μg/dL. As indicated in Figure 8-3, at 500 mg/kg lead, more than 99.4 percent of the children are expected to have blood lead levels of less than or equal to 15 μg/dL. A review of Table 7-290* indicates that six sites (Sites 1 and 32 Location II, and followup fieldwork Sites 2, 17, 19, and 22) have lead soil concentrations that exceed 500 mg/kg, indicating that they may potentially require remedial alternatives if a lead PRG of 500 mg/kg is selected.

TABLE 8-6*

Preliminary Remediation Goals (PRGs)
Exposure Pathway 2--Incidental Soil Ingestion
Residential Land Use Scenario

Analyte	PRGs (mg/kg) at Target Risk Levels			PRGs (mg/kg) for
	Risk = 1E-06	Risk = 1E-05	Risk = 1E-04	Hazard Index = 1
Aluminum	–	–	–	2.74E+05
Antimony	–	–	–	1.10E+02
Arsenic	3.65E-01	3.65E+00	3.65E+01	8.21E+01
Barium	–	–	–	1.92E+04
Beryllium	1.49E-01	1.49E+00	1.49E+01	1.37E+03
Cadmium	–	–	–	2.74E+02
Calcium	–	–	–	–
Chromium	–	–	–	1.37E+03
Cobalt	–	–	–	2.74E+00
Copper	–	–	–	1.01E+04
Iron	–	–	–	–
Lead	–	–	–	–
Magnesium	–	–	–	–
Manganese	–	–	–	2.74E+04
Mercury	–	–	–	8.21E+01
Nickel	–	–	–	5.48E+03
Potassium	–	–	–	–
Selenium	–	–	–	1.37E+03
Silver	–	–	–	1.37E+03
Sodium	–	–	–	–
Thallium	–	–	–	2.19E+01
Vanadium	–	–	–	1.92E+03
Zinc	–	–	–	5.48E+04
Cyanide	–	–	–	5.48E+03
135TNB	–	–	–	1.37E+01
13DNB	–	–	–	2.74E+01
246TNT	2.13E+01	2.13E+02	2.13E+03	1.37E+02
24DNT	9.39E-01	9.39E+00	9.39E+01	5.48E+02
26DNT	9.39E-01	9.39E+00	9.39E+01	2.74E+02
HMX	–	–	–	1.37E+04
NB	–	–	–	1.37E+02
RDX	5.81E+00	5.81E+01	5.81E+02	8.21E+02
Tetryl	–	–	–	2.74E+03
Nitrite/Nitrate	–	–	–	4.38E+05
Tetrachloroethylene	1.25E+01	1.25E+02	1.25E+03	2.74E+03
** **1,1,1-Trichloroethane**	–	–	–	**2.46E+04**
Trichloroethylene	5.81E+01	5.81E+02	5.81E+03	–
Xylenes	–	–	–	5.48E+05
Anthracene	–	–	–	8.21E+04
Benzo(a)anthracene	1.10E-01	1.10E+00	1.10E+01	–
** **Benzo(a)pyrene**	**1.10E-01**	**1.10E+00**	**1.10E+01**	–
Benzo(b)fluoranthene	1.10E-01	1.10E+00	1.10E+01	–
** **Benzo(ghi)perylene**	–	–	–	–
Benzo(k)fluoranthene	1.10E-01	1.10E+00	1.10E+01	–
Bis(2-ethylhexyl) phthalate	4.56E+01	4.56E+02	4.56E+03	5.48E+03
Chrysene	1.10E-01	1.10E+00	1.10E+01	–
Dibenzofuran	–	–	–	–
Di-n-butyl phthalate	–	–	–	2.74E+04
Fluoranthene	–	–	–	1.10E+04
** **Indeno(1,2,3-cd)pyrene**	**1.10E-01**	**1.10E+00**	**1.10E+01**	–
2-Methylnaphthalene	–	–	–	–
Naphthalene	–	–	–	1.09E+03
N-nitrosodiphenylamine	1.30E+02	1.30E+03	1.30E+04	–
Phenanthrene	–	–	–	–
Pyrene	–	–	–	8.21E+03
Chlordane	4.91E-01	4.91E+00	4.91E+01	1.64E+01
Dieldrin	3.99E-02	3.99E-01	3.99E+00	1.37E+01
DDD	2.66E+00	2.66E+01	2.66E+02	–
DDE	1.88E+00	1.88E+01	1.88E+02	–
DDT	1.88E+00	1.88E+01	1.88E+02	1.37E+02
Endrin	–	–	–	8.21E+01
PCB-1260	8.30E-02	8.30E-01	8.30E+00	–

"–" - Indicates that the relevant health effects criteria are unavailable.
* - Replaces original Table 8-6 in the Final Baseline RA; Dames & Moore, 1992a.
** - New contaminant of concern with the addition of followup fieldwork results.

TABLE 8-7*

Preliminary Remediation Goals (PRGs)
Exposure Pathway 2--Incidental Soil Ingestion
Light Industrial Land Use Scenario

Analyte	PRGs (mg/kg) at Target Risk Levels: Risk = 1.0E-06	Risk = 1.0E-05	Risk = 1.0E-04	PRGs (mg/kg) for Hazard Index = 1.0
Aluminum	–	–	–	NA
Antimony	–	–	–	8.18E+02
Arsenic	3.27E+00	3.27E+01	3.27E+02	6.13E+02
Barium	–	–	–	1.43E+05
Beryllium	1.33E+00	1.33E+01	1.33E+02	1.02E+04
Cadmium	–	–	–	2.04E+03
Calcium	–	–	–	–
Chromium	–	–	–	1.02E+04
Cobalt	–	–	–	2.04E+01
Copper	–	–	–	7.56E+04
Iron	–	–	–	–
Lead	–	–	–	–
Magnesium	–	–	–	–
Manganese	–	–	–	2.04E+05
Mercury	–	–	–	6.13E+02
Nickel	–	–	–	4.09E+04
Potassium	–	–	–	–
Selenium	–	–	–	1.02E+04
Silver	–	–	–	1.02E+04
Sodium	–	–	–	–
Thallium	–	–	–	1.64E+02
Vanadium	–	–	–	1.43E+04
Zinc	–	–	–	4.09E+05
Cyanide	–	–	–	4.09E+04
135TNB	–	–	–	1.02E+02
13DNB	–	–	–	2.04E+02
246TNT	1.91E+02	1.91E+03	1.91E+04	1.02E+03
24DNT	8.42E+00	8.42E+01	8.42E+02	4.09E+03
26DNT	8.42E+00	8.42E+01	8.42E+02	2.04E+03
HMX	–	–	–	1.02E+05
NB	–	–	–	1.02E+03
RDX	5.20E+01	5.20E+02	5.20E+03	6.13E+03
Tetryl	–	–	–	2.04E+04
Nitrite\Nitrate	–	–	–	NA
Tetrachloroethylene	1.12E+02	1.12E+03	1.12E+04	2.04E+04
** 1,1,1-Trichloroethane	–	–	–	1.84E+05
Trichloroethylene	5.20E+02	5.20E+03	5.20E+04	–
Xylenes	–	–	–	NA
Anthracene	–	–	–	6.13E+05
** Benzo(a)pyrene	9.87E-01	9.87E+00	9.87E+01	–
Benzo(a)anthracene	9.87E-01	9.87E+00	9.87E+01	–
Benzo(b)fluoranthene	9.87E-01	9.87E+00	9.87E+01	–
** Benzo(ghi)perylene	–	–	–	–
Benzo(k)fluoranthene	9.87E-01	9.87E+00	9.87E+01	–
Bis(2-ethylhexyl) phthalate	4.09E+02	4.09E+03	4.09E+04	4.09E+04
Chrysene	9.87E-01	9.87E+00	9.87E+01	–
Dibenzofuran	–	–	–	–
Di-n-butyl phthalate	–	–	–	2.04E+05
Fluoranthene	–	–	–	8.18E+04
** Indeno(1,2,3-cd)pyrene	9.87E-01	9.87E+00	9.87E+01	–
2-Methylnaphthalene	–	–	–	–
Naphthalene	–	–	–	8.18E+03
N-nitrosodiphenylamine	1.17E+03	1.17E+04	1.17E+05	–
Phenanthrene	–	–	–	–
Pyrene	–	–	–	6.13E+04
Chlordane	4.40E+00	4.40E+01	4.40E+02	1.23E+02
Dieldrin	3.58E-01	3.58E+00	3.58E+01	1.02E+02
DDD	2.38E+01	2.38E+02	2.38E+03	–
DDE	1.68E+01	1.68E+02	1.68E+03	–
DDT	1.68E+01	1.68E+02	1.68E+03	1.02E+03
Endrin	–	–	–	6.13E+02
PCB-1260	7.43E-01	7.43E+00	7.43E+01	–

'–' - Indicates that the relevant health effects criteria are unavailable.

NA - Not applicable because the calculated PRG is greater than one million parts per million (mg/kg).

* - Replaces original Table 8-7 in the Final Baseline RA; Dames & Moore, 1992a.

** - New contaminant of concern with the addition of followup fieldwork results.

TABLE 8-8*

Preliminary Remediation Goals (PRGs)
Exposure Pathway 2--Incidental Soil Ingestion
Military Land Use Scenario

Analyte	PRGs (mg/kg) at Target Risk Levels: Risk = 1.0E-06	Risk = 1.0E-05	Risk = 1.0E-04	PRGs (mg/kg) for Hazard Index = 1.0
Aluminum	-	-	-	NA
Antimony	-	-	-	8.76E+02
Arsenic	2.92E+01	2.92E+02	2.92E+03	6.57E+02
Barium	-	-	-	1.53E+05
Beryllium	1.19E+01	1.19E+02	1.19E+03	1.10E+04
Cadmium	-	-	-	2.19E+03
Calcium	-	-	-	-
Chromium	-	-	-	1.10E+04
Cobalt	-	-	-	2.19E+01
Copper	-	-	-	8.10E+04
Iron	-	-	-	-
Lead	-	-	-	-
Magnesium	-	-	-	-
Manganese	-	-	-	2.19E+05
Mercury	-	-	-	6.57E+02
Nickel	-	-	-	4.38E+04
Potassium	-	-	-	-
Selenium	-	-	-	1.10E+04
Silver	-	-	-	1.10E+04
Sodium	-	-	-	-
Thallium	-	-	-	1.75E+02
Vanadium	-	-	-	1.53E+04
Zinc	-	-	-	4.38E+05
Cyanide	-	-	-	4.38E+04
135TNB	-	-	-	1.10E+02
13DNB	-	-	-	2.19E+02
246TNT	1.70E+03	1.70E+04	1.70E+05	1.10E+03
24DNT	7.51E+01	7.51E+02	7.51E+03	4.38E+03
26DNT	7.51E+01			2.19E+03
HMX	-	-	-	1.10E+05
NB	-	-	-	1.10E+03
RDX	4.65E+02	4.65E+03	4.65E+04	6.57E+03
Tetryl	-	-	-	2.19E+04
Nitrite\Nitrate	-	-	-	NA
Tetrachloroethylene	1.00E+03	1.00E+04	1.00E+05	2.19E+04
** 1,1,1-Trichloroethane	-	-	-	1.97E+05
Trichloroethylene	4.65E+03	4.65E+04	4.65E+05	-
Xylenes	-	-	-	NA
Anthracene	-	-	-	6.57E+05
Benzo(a)anthracene	8.81E+00	8.81E+01	8.81E+02	-
** Benzo(a)pyrene	8.81E+00	8.81E+01	8.81E+02	-
Benzo(b)fluoranthene	8.81E+00	8.81E+01	8.81E+02	-
** Benzo(ghi)perylene	-	-	-	-
Benzo(k)fluoranthene	8.81E+00	8.81E+01	8.81E+02	-
Bis(2-ethylhexyl) phthalate	3.65E+03	3.65E+04	3.65E+05	4.38E+04
Chrysene	8.81E+00	8.81E+01	8.81E+02	-
Dibenzofuran	-	-	-	-
Di-n-butyl phthalate	-	-	-	2.19E+05
Fluoranthene	-	-	-	8.76E+04
** Indeno(1,2,3-cd)pyrene	8.81E+00	8.81E+01	8.81E+02	-
2-Methylnaphthalene	-	-	-	-
Naphthalene	-	-	-	8.76E+03
N-nitrosodiphenylamine	1.04E+04	1.04E+05	1.04E+06	-
Phenanthrene	-	-	-	-
Pyrene	-	-	-	6.57E+04
Chlordane	3.93E+01	3.93E+02	3.93E+03	1.31E+02
Dieldrin	3.19E+00	3.19E+01	3.19E+02	1.10E+02
DDD	2.13E+02	2.13E+03	2.13E+04	-
DDE	1.50E+02	1.50E+03	1.50E+04	-
DDT	1.50E+02	1.50E+03	1.50E+04	1.10E+03
Endrin	-	-	-	6.57E+02
PCB-1260	6.64E+00	6.64E+01	6.64E+02	-

'-' - Indicates that the relevant health effects criteria are unavailable.
NA - Not applicable because the calculated PRG is greater than one million parts per million (mg/kg).
* - Replaces original Table 8-8 in the Final Baseline RA; Dames & Moore, 1992a.
** - New contaminant of concern with the addition of followup fieldwork results.

TABLE 8-9*

Preliminary Remediation Goals (PRGs)
Exposure Pathway 2--Incidental Soil Ingestion
Construction Land Use Scenario

Analyte	PRGs (mg/kg) at Target Risk Levels			PRGs (mg/kg) for
	Risk = 1.0E-06	Risk = 1.0E-05	Risk = 1.0E-04	Hazard Index = 1.0
Aluminum	–	–	–	3.19E+05
Antimony	–	–	–	1.27E+02
Arsenic	6.37E+00	6.37E+01	6.37E+02	9.56E+01
Barium	–	–	–	2.23E+04
Beryllium	2.59E+00	2.59E+01	2.59E+02	1.59E+03
Cadmium	–	–	–	3.19E+02
Calcium	–	–	–	–
Chromium	–	–	–	1.59E+03
Cobalt	–	–	–	3.19E+00
Copper	–	–	–	1.18E+04
Iron	–	–	–	–
Lead	–	–	–	–
Magnesium	–	–	–	–
Manganese	–	–	–	3.19E+04
Mercury	–	–	–	9.56E+01
Nickel	–	–	–	6.37E+03
Potassium	–	–	–	–
Selenium	–	–	–	1.59E+03
Silver	–	–	–	1.59E+03
Sodium	–	–	–	–
Thallium	–	–	–	2.55E+01
Vanadium	–	–	–	2.23E+03
Zinc	–	–	–	6.37E+04
Cyanide	–	–	–	6.37E+03
135TNB	–	–	–	1.59E+01
13DNB	–	–	–	3.19E+01
246TNT	3.72E+02	3.72E+03	3.72E+04	1.59E+02
24DNT	1.64E+01	1.64E+02	1.64E+03	6.37E+02
26DNT	1.64E+01	1.64E+02	1.64E+03	3.19E+02
HMX	–	–	–	1.59E+04
NB	–	–	–	1.59E+02
RDX	1.01E+02	1.01E+03	1.01E+04	9.56E+02
Tetryl	–	–	–	3.19E+03
Nitrite\Nitrate	–	–	–	5.10E+05
Tetrachloroethylene	2.19E+02	2.19E+03	2.19E+04	3.19E+03
** 1,1,1-Trichloroethane	–	–	–	2.87E+04
Trichloroethylene	1.01E+03	1.01E+04	1.01E+05	–
Xylenes	–	–	–	6.37E+05
Anthracene	–	–	–	9.56E+04
Benzo(a)anthracene	1.92E+00	1.92E+01	1.92E+02	–
** Benzo(a)pyrene	1.92E+00	1.92E+01	1.92E+02	–
Benzo(b)fluoranthene	1.92E+00	1.92E+01	1.92E+02	–
** Benzo(ghi)perylene	–	–	–	–
Benzo(k)fluoranthene	1.92E+00	1.92E+01	1.92E+02	–
Bis(2-ethylhexyl) phthalate	7.97E+02	7.97E+03	7.97E+04	6.37E+03
Chrysene	1.92E+00	1.92E+01	1.92E+02	–
Dibenzofuran	–	–	–	–
Di-n-butyl phthalate	–	–	–	3.19E+04
Fluoranthene	–	–	–	1.27E+04
** Indeno(1,2,3-cd)pyrene	1.92E+00	1.92E+01	1.92E+02	–
2-Methylnaphthalene	–	–	–	–
Naphthalene	–	–	–	1.27E+03
N-nitrosodiphenylamine	2.28E+03	2.28E+04	2.28E+05	–
Phenanthrene	–	–	–	–
Pyrene	–	–	–	9.56E+03
Chlordane	8.58E+00	8.58E+01	8.58E+02	1.91E+01
Dieldrin	6.97E-01	6.97E+00	6.97E+01	1.59E+01
DDD	4.65E+01	4.65E+02	4.65E+03	–
DDE	3.28E+01	3.28E+02	3.28E+03	–
DDT	3.28E+01	3.28E+02	3.28E+03	1.59E+02
Endrin	–	–	–	9.56E+01
PCB-1260	1.45E+00	1.45E+01	1.45E+02	–

'–' - Indicates that the relevant health effects criteria are unavailable.
* - Replaces original Table 8-9 in the Final Baseline RA; Dames & Moore, 1992a.
** - New contaminant of concern with the addition of followup fieldwork results.

TABLE 8-10*

Preliminary Remediation Goals (PRGs)
Exposure Pathway 2–Incidental Soil Ingestion
Agricultural Land Use Scenario

Analyte	PRGs (mg/kg) at Target Risk Levels: Risk = 1.0E-06	Risk = 1.0E-05	Risk = 1.0E-04	PRGs (mg/kg) for Hazard Index = 1.0
Aluminum	–	–	–	NA
Antimony	–	–	–	7.10E+02
Arsenic	1.77E+00	1.77E+01	1.77E+02	5.32E+02
Barium	–	–	–	1.24E+05
Beryllium	7.22E-01	7.22E+00	7.22E+01	8.87E+03
Cadmium	–	–	–	1.77E+03
Calcium	–	–	–	–
Chromium	–	–	–	8.87E+03
Cobalt	–	–	–	1.77E+01
Copper	–	–	–	6.56E+04
Iron	–	–	–	–
Lead	–	–	–	–
Magnesium	–	–	–	–
Manganese	–	–	–	1.77E+05
Mercury	–	–	–	5.32E+02
Nickel	–	–	–	3.55E+04
Potassium	–	–	–	–
Selenium	–	–	–	8.87E+03
Silver	–	–	–	8.87E+03
Sodium	–	–	–	–
Thallium	–	–	–	1.42E+02
Vanadium	–	–	–	1.24E+04
Zinc	–	–	–	3.55E+05
Cyanide	–	–	–	3.55E+04
135TNB	–	–	–	8.87E+01
13DNB	–	–	–	1.77E+02
246TNT	1.04E+02	1.04E+03	1.04E+04	8.87E+02
24DNT	4.57E+00	4.57E+01	4.57E+02	3.55E+03
26DNT	4.57E+00	4.57E+01	4.57E+02	1.77E+03
HMX	–	–	–	8.87E+04
NB	–	–	–	8.87E+02
RDX	2.82E+01	2.82E+02	2.82E+03	5.32E+03
Tetryl	–	–	–	1.77E+04
Nitrite\Nitrate	–	–	–	NA
Tetrachloroethylene	6.09E+01	6.09E+02	6.09E+03	1.77E+04
** 1,1,1-Trichloroethane	–	–	–	1.60E+05
Trichloroethylene	2.82E+02	2.82E+03	2.82E+04	–
Xylenes	–	–	–	NA
Anthracene	–	–	–	5.32E+05
Benzo(a)anthracene	5.35E-01	5.35E+00	5.35E+01	–
** Benzo(a)pyrene	5.35E-01	5.35E+00	5.35E+01	–
Benzo(b)fluoranthene	5.35E-01	5.35E+00	5.35E+01	–
** Benzo(ghi)perylene	–	–	–	–
Benzo(k)fluoranthene	5.35E-01	5.35E+00	5.35E+01	–
Bis(2-ethylhexyl) phthalate	2.22E+02	2.22E+03	2.22E+04	3.55E+04
Chrysene	5.35E-01	5.35E+00	5.35E+01	–
Dibenzofuran	–	–	–	–
Di-n-butyl phthalate	–	–	–	1.77E+05
Fluoranthene	–	–	–	7.10E+04
** Indeno(1,2,3-cd)pyrene	5.35E-01	5.35E+00	5.35E+01	–
2-Methylnaphthalene	–	–	–	–
Naphthalene	–	–	–	7.10E+03
N-nitrosodiphenylamine	6.34E+02	6.34E+03	6.34E+04	–
Phenanthrene	–	–	–	–
Pyrene	–	–	–	5.32E+04
Chlordane	2.39E+00	2.39E+01	2.39E+02	1.06E+02
Dieldrin	1.94E-01	1.94E+00	1.94E+01	8.87E+01
DDD	1.29E+01	1.29E+02	1.29E+03	–
DDE	9.13E+00	9.13E+01	9.13E+02	–
DDT	9.13E+00	9.13E+01	9.13E+02	8.87E+02
Endrin	–	–	–	5.32E+02
PCB-1260	4.03E-01	4.03E+00	4.03E+01	–

'–' - Indicates that the relevant health effects criteria are unavailable.
NA - Not applicable because the calculated PRG is greater than one million parts per million (mg/kg).
** - New contaminant of concern with the addition of followup fieldwork results.

TABLE 8-11*

Preliminary Remediation Goals (PRGs)
Exposure Pathway 3--Inhalation of Dust
Residential Land Use Scenario

Analyte	Dust Source (Soil) PRGs (mg/kg) for Various Target Risk Levels: Risk = 1.0E-06	Risk = 1.0E-05	Risk = 1.0E-04	Dust Source (Soil) PRGs (mg/kg) Hazard Index = 1
Aluminum	-	-	-	-
Antimony	-	-	-	-
Arsenic	5.71E+01	5.71E+02	5.71E+03	-
Barium	-	-	-	4.79E+04
Beryllium	9.51E+01	9.51E+02	9.51E+03	-
Cadmium	1.27E+02	1.27E+03	1.27E+04	-
Calcium	-	-	-	-
Chromium	1.90E+01	1.90E+02	1.90E+03	2.05E+02
Cobalt	-	-	-	9.79E+04
Copper	-	-	-	NA
Iron	-	-	-	NA
Lead	-	-	-	-
Magnesium	-	-	-	-
Manganese	-	-	-	3.42E+04
Mercury	-	-	-	3.08E+04
Nickel	4.70E+02	4.70E+03	4.70E+04	-
Potassium	-	-	-	-
Selenium	-	-	-	-
Silver	-	-	-	-
Sodium	-	-	-	-
Thallium	-	-	-	-
Vanadium	-	-	-	-
Zinc	-	-	-	-
Cyanide	-	-	-	-
135TNB	-	-	-	-
13DNB	-	-	-	-
246TNT	-	-	-	-
24DNT	-	-	-	-
26DNT	-	-	-	-
HMX	-	-	-	-
NB	-	-	-	2.05E+05
RDX	-	-	-	-
Tetryl	-	-	-	-
Nitrite\Nitrate	-	-	-	-
Tetrachloroethylene	4.44E+05	NA	NA	-
** 1,1,1-Trichloroethane	-	-	-	NA
Trichloroethylene	1.33E+05	NA	NA	-
Xylenes	-	-	-	NA
Anthracene	-	-	-	-
Benzo(a)anthracene	1.31E+02	1.31E+03	1.31E+04	-
** Benzo(a)pyrene	1.31E+02	1.31E+03	1.31E+04	-
Benzo(b)fluoranthene	1.31E+02	1.31E+03	1.31E+04	-
** Benzo(ghi)perylene	-	-	-	-
Benzo(k)fluoranthene	1.31E+02	1.31E+03	1.31E+04	-
Bis(2-ethylhexyl) phthalate	-	-	-	-
Chrysene	1.31E+02	1.31E+03	1.31E+04	-
Dibenzofuran	-	-	-	-
Di-n-butyl phthalate	-	-	-	-
Fluoranthene	-	-	-	-
** Indeno(1,2,3-cd)pyrene	1.31E+02	1.31E+03	1.31E+04	-
2-Methylnaphthalene	-	-	-	-
Naphthalene	-	-	-	-
N-nitrosodiphenylamine	-	-	-	-
Phenanthrene	-	-	-	-
Pyrene	-	-	-	-
Chlordane	6.15E+02	6.15E+03	6.15E+04	-
Dieldrin	4.99E+01	4.99E+02	4.99E+03	-
DDD	-	-	-	-
DDE	-	-	-	-
DDT	2.35E+03	2.35E+04	2.35E+05	-
Endrin	-	-	-	-
PCB-1260	-	-	-	-

'-' - Indicates that the relevant health effects criteria are unavailable.
NA - Not applicable because the calculated PRG is greater than one million parts per million (mg/kg).
* - Replaces original Table 8-11 in the Final Baseline RA; Dames & Moore, 1992a.
** - New contaminant of concern with the addition of followup fieldwork results.

TABLE 8-12*

Preliminary Remediation Goals (PRGs)
Exposure Pathway 3--Inhalation of Dust
Light Industrial Land Use Scenario

Analyte	Dust Source (Soil) PRGs (mg/kg) for Various Target Risk Levels			Dust Source (Soil) PRGs (mg/kg)
	Risk = 1.0E-06	Risk = 1.0E-05	Risk = 1.0E-04	Hazard Index = 1
Aluminum	--	--	--	--
Antimony	--	--	--	--
Arsenic	1.24E+00	1.24E+01	1.24E+02	--
Barium	--	--	--	8.66E+02
Beryllium	2.06E+00	2.06E+01	2.06E+02	--
Cadmium	2.75E+00	2.75E+01	2.75E+02	--
Calcium	--	--	--	--
Chromium	4.13E-01	4.13E+00	4.13E+01	3.71E+00
Cobalt	--	--	--	1.77E+03
Copper	--	--	--	6.19E+04
Iron	--	--	--	5.32E+04
Lead	--	--	--	--
Magnesium	--	--	--	--
Manganese	--	--	--	6.19E+02
Mercury	--	--	--	5.57E+02
Nickel	1.02E+01	1.02E+02	1.02E+03	--
Potassium	--	--	--	--
Selenium	--	--	--	--
Silver	--	--	--	--
Sodium	--	--	--	--
Thallium	--	--	--	--
Vanadium	--	--	--	--
Zinc	--	--	--	--
Cyanide	--	--	--	--
135TNB	--	--	--	--
13DNB	--	--	--	--
246TNT	--	--	--	--
24DNT	--	--	--	--
26DNT	--	--	--	--
HMX	--	--	--	--
NB	--	--	--	3.71E+03
RDX	--	--	--	--
Tetryl	--	--	--	--
Nitrite\Nitrate	--	--	--	--
Tetrachloroethylene	9.63E+03	9.63E+04	9.63E+05	--
** 1,1,1-Trichloroethane	--	--	--	NA
Trichloroethylene	2.89E+03	2.89E+04	2.89E+05	--
Xylenes	--	--	--	6.19E+05
Anthracene	--	--	--	--
Benzo(a)anthracene	2.84E+00	2.84E+01	2.84E+02	--
** Benzo(a)pyrene	2.84E+00	2.84E+01	2.84E+02	--
Benzo(b)fluoranthene	2.84E+00	2.84E+01	2.84E+02	--
** Benzo(ghi)perylene	--	--	--	--
Benzo(k)fluoranthene	2.84E+00	2.84E+01	2.84E+02	--
Bis(2-ethylhexyl) phthalate	--	--	--	--
Chrysene	2.84E+00	2.84E+01	2.84E+02	--
Dibenzofuran	--	--	--	--
Di-n-butyl phthalate	--	--	--	--
Fluoranthene	--	--	--	--
** Indeno(1,2,3-cd)pyrene	2.84E+00	2.84E+01	2.84E+02	--
2-Methylnaphthalene	--	--	--	--
Naphthalene	--	--	--	--
N-nitrosodiphenylamine	--	--	--	--
Phenanthrene	--	--	--	--
Pyrene	--	--	--	--
Chlordane	1.33E+01	1.33E+02	1.33E+03	--
Dieldrin	1.08E+00	1.08E+01	1.08E+02	--
DDD	--	--	--	--
DDE	--	--	--	--
DDT	5.10E+01	5.10E+02	5.10E+03	--
Endrin	--	--	--	--
PCB-1260	--	--	--	--

"--" - Indicates that the relevant health effects criteria are unavailable.
* - Replaces original Table 8-12 in the Final Baseline RA; Dames & Moore, 1992a.
** - New contaminant of concern with the addition of followup fieldwork results.

TABLE 8-13*

Preliminary Remediation Goals (PRGs)
Exposure Pathway 3--Inhalation of Dust
Military Land Use Scenario

Analyte	Dust Source (Soil) PRGs (mg/kg) for Various Target Risk Levels: Risk = 1.0E-06	Risk = 1.0E-05	Risk = 1.0E-04	Dust Source (Soil) PRGs (mg/kg) Hazard Index = 1
Aluminum	-	-	-	-
Antimony	-	-	-	-
Arsenic	1.11E+01	1.11E+02	1.11E+03	-
Barium	-	-	-	9.28E+02
Beryllium	1.84E+01	1.84E+02	1.84E+03	-
Cadmium	2.46E+01	2.46E+02	2.46E+03	-
Calcium	-	-	-	-
Chromium	3.68E+00	3.68E+01	3.68E+02	3.98E+00
Cobalt	-	-	-	1.90E+03
Copper	-	-	-	6.63E+04
Iron	-	-	-	5.70E+04
Lead	-	-	-	-
Magnesium	-	-	-	-
Manganese	-	-	-	6.63E+02
Mercury	-	-	-	5.97E+02
Nickel	9.10E+01	9.10E+02	9.10E+03	-
Potassium	-	-	-	-
Selenium	-	-	-	-
Silver	-	-	-	-
Sodium	-	-	-	-
Thallium	-	-	-	-
Vanadium	-	-	-	-
Zinc	-	-	-	-
Cyanide	-	-	-	-
135TNB	-	-	-	-
13DNB	-	-	-	-
246TNT	-	-	-	-
24DNT	-	-	-	-
26DNT	-	-	-	-
HMX	-	-	-	-
NB	-	-	-	3.98E+03
RDX	-	-	-	-
Tetryl	-	-	-	-
Nitrite\Nitrate	-	-	-	-
Tetrachloroethylene	8.59E+04	8.59E+05	NA	-
** 1,1,1-Trichloroethane	-	-	-	NA
Trichloroethylene	2.58E+04	2.58E+05	NA	-
Xylenes	-	-	-	6.63E+05
Anthracene	-	-	-	-
Benzo(a)anthracene	2.54E+01	2.54E+02	2.54E+03	-
** Benzo(a)pyrene	2.54E+01	2.54E+02	2.54E+03	-
Benzo(b)fluoranthene	2.54E+01	2.54E+02	2.54E+03	-
** Benzo(ghi)perylene	-	-	-	-
Benzo(k)fluoranthene	2.54E+01	2.54E+02	2.54E+03	-
Bis(2-ethylhexyl) phthalate	-	-	-	-
Chrysene	2.54E+01	2.54E+02	2.54E+03	-
Dibenzofuran	-	-	-	-
Di-n-butyl phthalate	-	-	-	-
Fluoranthene	-	-	-	-
** Indeno(1,2,3-cd)pyrene	2.54E+01	2.54E+02	2.54E+03	-
2-Methylnaphthalene	-	-	-	-
Naphthalene	-	-	-	-
N-nitrosodiphenylamine	-	-	-	-
Phenanthrene	-	-	-	-
Pyrene	-	-	-	-
Chlordane	1.19E+02	1.19E+03	1.19E+04	-
Dieldrin	9.67E+00	9.67E+01	9.67E+02	-
DDD	-	-	-	-
DDE	-	-	-	-
DDT	4.55E+02	4.55E+03	4.55E+04	-
Endrin	-	-	-	-
PCB-1260	-	-	-	-

'-' - Indicates that the relevant health effects criteria are unavailable.
NA - Not applicable because the calculated PRG is greater than one million parts per million (mg/kg).
* - Replaces original Table 8-13 in the Final Baseline RA; Dames & Moore, 1992a.
** - New contaminant of concern with the addition of followup fieldwork results.

TABLE 8-14*

Preliminary Remediation Goals (PRGs)
Exposure Pathway 3--Inhalation of Dust
Construction Land Use Scenario

Analyte	Dust Source (Soil) PRGs (mg/kg) for Various Target Risk Levels: Risk = 1.0E-06	Risk = 1.0E-05	Risk = 1.0E-04	Dust Source (Soil) PRGs (mg/kg) Hazard Index = 1
Aluminum	–	–	–	–
Antimony	–	–	–	–
Arsenic	1.54E+01	1.54E+02	1.54E+03	–
Barium	–	–	–	8.65E+02
Beryllium	2.57E+01	2.57E+02	2.57E+03	–
Cadmium	3.43E+01	3.43E+02	3.43E+03	–
Calcium	–	–	–	–
Chromium	5.15E+00	5.15E+01	5.15E+02	3.71E+00
Cobalt	–	–	–	1.77E+03
Copper	–	–	–	6.18E+04
Iron	–	–	–	5.31E+04
Lead	–	–	–	–
Magnesium	–	–	–	–
Manganese	–	–	–	6.18E+02
Mercury	–	–	–	5.56E+02
Nickel	1.27E+02	1.27E+03	1.27E+04	–
Potassium	–	–	–	–
Selenium	–	–	–	–
Silver	–	–	–	–
Sodium	–	–	–	–
Thallium	–	–	–	–
Vanadium	–	–	–	–
Zinc	–	–	–	–
Cyanide	–	–	–	–
135TNB	–	–	–	–
13DNB	–	–	–	–
246TNT	–	–	–	–
24DNT	–	–	–	–
26DNT	–	–	–	–
HMX	–	–	–	–
NB	–	–	–	3.71E+03
RDX	–	–	–	–
Tetryl	–	–	–	–
Nitrite\Nitrate	–	–	–	–
Tetrachloroethylene	1.20E+05	NA	NA	–
** 1,1,1-Trichloroethane	–	–	–	NA
Trichloroethylene	3.60E+04	3.60E+05	NA	–
Xylenes	–	–	–	6.18E+05
Anthracene	–	–	–	–
Benzo(a)anthracene	3.54E+01	3.54E+02	3.54E+03	–
** Benzo(a)pyrene	3.54E+01	3.54E+02	3.54E+03	–
Benzo(b)fluoranthene	3.54E+01	3.54E+02	3.54E+03	–
** Benzo(ghi)perylene	–	–	–	–
Benzo(k)fluoranthene	3.54E+01	3.54E+02	3.54E+03	–
Bis(2-ethylhexyl) phthalate	–	–	–	–
Chrysene	3.54E+01	3.54E+02	3.54E+03	–
Dibenzofuran	–	–	–	–
Di-n-butyl phthalate	–	–	–	–
Fluoranthene	–	–	–	–
** Indeno(1,2,3-cd)pyrene	3.54E+01	3.54E+02	3.54E+03	–
2-Methylnaphthalene	–	–	–	–
Naphthalene	–	–	–	–
N-nitrosodiphenylamine	–	–	–	–
Phenanthrene	–	–	–	–
Pyrene	–	–	–	–
Chlordane	1.66E+02	1.66E+03	1.66E+04	–
Dieldrin	1.35E+01	1.35E+02	1.35E+03	–
DDD	–	–	–	–
DDE	–	–	–	–
DDT	6.36E+02	6.36E+03	6.36E+04	–
Endrin	–	–	–	–
PCB-1260	–	–	–	–

'–' - Indicates that the relevant health effects criteria are unavailable.
NA - Not applicable because the calculated PRG is greater than one million parts per million (mg/kg).
* - Replaces original Table 8-14 in the Final Baseline RA; Dames & Moore, 1992a.
** - New contaminant of concern with the addition of followup fieldwork results.

TABLE 8-15*

Preliminary Remediation Goals (PRGs)
Exposure Pathway 3--Inhalation of Dust
Agricultural Land Use Scenario

Analyte	Dust Source (Soil) PRGs (mg/kg) for Various Target Risk Levels			Dust Source (Soil) PRGs (mg/kg)
	Risk = 1.0E-06	Risk = 1.0E-05	Risk = 1.0E-04	Hazard Index = 1
Aluminum	–	–	–	–
Antimony	–	–	–	–
Arsenic	2.65E+02	2.65E+03	2.65E+04	–
Barium	–	–	–	2.97E+05
Beryllium	4.42E+02	4.42E+03	4.42E+04	–
Cadmium	5.89E+02	5.89E+03	5.89E+04	–
Calcium	–	–	–	–
Chromium	8.83E+01	8.83E+02	8.83E+03	1.27E+03
Cobalt	–	–	–	6.06E+05
Copper	–	–	–	NA
Iron	–	–	–	NA
Lead	–	–	–	–
Magnesium	–	–	–	–
Manganese	–	–	–	2.12E+05
Mercury	–	–	–	1.91E+05
Nickel	2.18E+03	2.18E+04	2.18E+05	–
Potassium	–	–	–	–
Selenium	–	–	–	–
Silver	–	–	–	–
Sodium	–	–	–	–
Thallium	–	–	–	–
Vanadium	–	–	–	–
Zinc	–	–	–	–
Cyanide	–	–	–	–
135TNB	–	–	–	–
13DNB	–	–	–	–
246TNT	–	–	–	–
24DNT	–	–	–	–
26DNT	–	–	–	–
HMX	–	–	–	–
NB	–	–	–	NA
RDX	–	–	–	–
Tetryl	–	–	–	–
Nitrite\Nitrate	–	–	–	–
Tetrachloroethylene	NA	NA	NA	–
** 1,1,1-Trichloroethane	–	–	–	NA
Trichloroethylene	6.18E+05	NA	NA	–
Xylenes	–	–	–	NA
Anthracene	–	–	–	–
Benzo(a)anthracene	6.08E+02	6.08E+03	6.08E+04	–
** Benzo(a)pyrene	6.08E+02	6.08E+03	6.08E+04	–
Benzo(b)fluoranthene	6.08E+02	6.08E+03	6.08E+04	–
** Benzo(ghi)perylene	–	–	–	–
Benzo(k)fluoranthene	6.08E+02	6.08E+03	6.08E+04	–
Bis(2-ethylhexyl) phthalate	–	–	–	–
Chrysene	6.08E+02	6.08E+03	6.08E+04	–
Dibenzofuran	–	–	–	–
Di-n-butyl phthalate	–	–	–	–
Fluoranthene	–	–	–	–
** Indeno(1,2,3-cd)pyrene	6.08E+02	6.08E+03	6.08E+04	–
2-Methylnaphthalene	–	–	–	–
Naphthalene	–	–	–	–
N-nitrosodiphenylamine	–	–	–	–
Phenanthrene	–	–	–	–
Pyrene	–	–	–	–
Chlordane	2.85E+03	2.85E+04	2.85E+05	–
Dieldrin	2.32E+02	2.32E+03	2.32E+04	–
DDD	–	–	–	–
DDE	–	–	–	–
DDT	1.09E+04	1.09E+05	NA	–
Endrin	–	–	–	–
PCB-1260	–	–	–	–

'–' - Indicates that the relevant health effects criteria are unavailable.
NA - Not applicable because the calculated PRG is greater than one million parts per million (mg/kg).
* - Replaces original Table 8-15 in the Final Baseline RA; Dames & Moore, 1992a.
** - New contaminant of concern with the addition of followup fieldwork results.

TABLE 8-24*

Preliminary Remediation Goals (PRGs)
Exposure Pathway 10--Consumption of Game (Antelope)
Residential Land Use Scenario

Analyte (a)	Soil PRGs (mg/kg) for Various Target Risk Levels			Soil PRGs (mg/kg) for
	Risk = 1.0E-06	Risk = 1.0E-05	Risk = 1.0E-04	Hazard Index = 1.0
Arsenic	2.42E+03	2.42E+04	2.42E+05	5.44E+05
Beryllium	7.87E+03	7.87E+04	7.87E+05	NA
Cadmium	–	–	–	6.91E+05
Chromium	–	–	–	NA
Lead	–	–	–	–
Mercury	–	–	–	1.79E+03
Nickel	–	–	–	NA
135TNB	–	–	–	1.69E+03
13DNB	–	–	–	3.56E+03
246TNT	3.06E+03	3.06E+04	3.06E+05	1.96E+04
24DNT	1.31E+02	1.31E+03	1.31E+04	7.62E+04
26DNT	1.32E+02	1.32E+03	1.32E+04	3.84E+04
HMX	–	–	–	NA
NB	–	–	–	1.91E+04
RDX	6.73E+02	6.73E+03	6.73E+04	9.52E+04
Tetryl	–	–	–	3.68E+05
Tetrachloroethylene	2.19E+03	2.19E+04	2.19E+05	4.80E+05
** 1,1,1-Trichloroethane	–	–	–	NA
Trichloroethylene	8.74E+03	8.74E+04	8.74E+05	–
Xylenes	–	–	–	NA
Anthracene	–	–	–	NA
Benzo(a)anthracene	3.01E+01	3.01E+02	3.01E+03	–
** Benzo(a)pyrene	3.28E+01	3.28E+02	3.28E+03	–
Benzo(b)fluoranthene	3.25E+01	3.25E+02	3.25E+03	–
** Benzo(ghi)perylene	–	–	–	–
Benzo(k)fluoranthene	3.75E+01	3.75E+02	3.75E+03	–
Bis(2-ethylhexyl) phthalate	1.10E+04	1.10E+05	NA	NA
Chrysene	3.01E+01	3.01E+02	3.01E+03	–
Dibenzofuran	–	–	–	–
Di-n-butyl phthalate	–	–	–	NA
Fluoranthene	–	–	–	NA
** Indeno(1,2,3-cd)pyrene	3.22E+01	3.22E+02	3.22E+03	–
2-Methylnaphthalene	–	–	–	–
Naphthalene	–	–	–	NA
N-nitrosodiphenylamine	2.29E+04	2.29E+05	NA	–
Phenanthrene	–	–	–	–
Pyrene	–	–	–	NA
Chlordane	1.33E+02	1.33E+03	1.33E+04	4.43E+03
Dieldrin	8.79E+00	8.79E+01	8.79E+02	3.01E+03
DDD	7.22E+02	7.22E+03	7.22E+04	–
DDE	5.23E+02	5.23E+03	5.23E+04	–
DDT	5.89E+02	5.89E+03	5.89E+04	4.29E+04
Endrin	–	–	–	2.14E+04
PCB-1260	2.47E+01	2.47E+02	2.47E+03	–

'–' - Indicates that the relevant health effects criteria are unavailable.
NA - Not applicable because the calculated PRG is greater than one million parts per million (mg/kg).
(a) - PRGs are only calculated for the inorganic analytes for which fate and transport data (e.g., uptake factors and transfer coefficients) exist.
* - Replaces original Table 8-24 in the Final Baseline RA; Dames & Moore, 1992a.
** - New contaminant of concern with the addition of followup fieldwork results.

TABLE 8-25*

Preliminary Remediation Goals (PRGs)
Exposure Pathway 11--Consumption of Beef and Milk
Residential Land Use Scenario

Analyte (a)	Soil PRGs (mg/kg) at Target Risk Levels: Risk = 1.0E-06	Soil PRGs (mg/kg) at Target Risk Levels: Risk = 1.0E-05	Soil PRGs (mg/kg) at Target Risk Levels: Risk = 1.0E-04	Soil PRGs (mg/kg) Hazard Index = 1.0	Water PRGs (mg/l) at Target Risk Levels: Risk = 1.0E-06	Water PRGs (mg/l) at Target Risk Levels: Risk = 1.0E-05	Water PRGs (mg/l) at Target Risk Levels: Risk = 1.0E-04	Water PRGs (mg/l) Hazard Index = 1.0
Arsenic	4.09E+01	4.09E+02	4.09E+03	1.24E+04	5.94E-03	5.94E-02	5.94E-01	1.80E+00
Beryllium	2.08E+02	2.08E+03	2.08E+04	NA	7.56E-03	7.56E-02	7.56E-01	1.29E+02
Cadmium	–	–	–	1.28E+03	–	–	–	2.76E+00
Chromium	–	–	–	2.45E+05	–	–	–	7.12E+00
Lead	–	–	–	–	–	–	–	–
Mercury	–	–	–	4.91E+01	–	–	–	1.61E-01
Nickel	–	–	–	1.97E+06	–	–	–	4.29E+01
135TNB	–	–	–	2.48E+01	–	–	–	2.00E+01
13DNB	–	–	–	5.21E+01	–	–	–	2.77E+01
246TNT	4.46E+01	4.46E+02	4.46E+03	2.87E+02	1.21E+01	1.21E+02	1.21E+03	7.75E+01
24DNT	1.91E+00	1.91E+01	1.91E+02	1.11E+03	5.32E-01	5.32E+00	5.32E+01	3.10E+02
26DNT	1.92E+00	1.92E+01	1.92E+02	5.61E+02	9.02E-01	9.02E+00	9.02E+01	1.76E+02
HMX	–	–	–	2.10E+04	–	–	–	5.74E+04
NB	–	–	–	2.79E+02	–	–	–	9.20E+01
RDX	9.84E+00	9.84E+01	9.84E+02	1.30E+03	1.24E+01	1.24E+02	1.24E+03	1.75E+03
Tetryl	–	–	–	5.38E+03	–	–	–	2.32E+03
Benzene	4.72E+01	4.72E+02	4.72E+03	–	1.07E+01	1.07E+02	1.07E+03	–
Tetrachloroethylene	3.21E+01	3.21E+02	3.21E+03	7.01E+03	1.90E+00	1.90E+01	1.90E+02	4.16E+02
** 1,1,1-Trichloroethane	–	–	–	5.83E+04	–	–	–	7.93E+03
Trichloroethylene	1.28E+02	1.28E+03	1.28E+04	–	2.35E+01	2.35E+02	2.35E+03	–
Xylenes	–	–	–	NA	–	–	–	8.17E+04
Anthracene	–	–	–	2.66E+05	–	–	–	2.77E+03
Benzo(a)anthracene	4.30E-01	4.30E+00	4.30E+01	–	9.71E-04	9.71E-03	9.71E-02	–
** Benzo(a)pyrene	4.70E-01	4.70E+00	4.70E+01	–	5.96E-04	5.96E-03	5.96E-02	–
Benzo(b)fluoranthene	4.75E-01	4.75E+00	4.75E+01	–	5.94E-04	5.94E-03	5.94E-02	–
** Benzo(ghi)perylene	–	–	–	–	–	–	–	–
Benzo(k)fluoranthene	5.49E-01	5.49E+00	5.49E+01	–	2.37E-04	2.37E-03	2.37E-02	–
Bis(2-ethylhexyl) phthalate	1.60E+02	1.60E+03	1.60E+04	1.92E+04	9.37E-01	9.37E+00	9.37E+01	1.12E+02
Chrysene	4.30E-01	4.30E+00	4.30E+01	–	9.71E-04	9.71E-03	9.71E-02	–
Dibenzofuran	–	–	–	–	–	–	–	–
Di-n-butyl phthalate	–	–	–	1.10E+06	–	–	–	2.46E+02
Fluoranthene	–	–	–	4.17E+04	–	–	–	1.34E+02
** Indeno(1,2,3-cd)pyrene	4.70E-01	4.70E+00	4.70E+01	–	6.45E-04	6.45E-03	6.45E-02	–
2-Methylnaphthalene	–	–	–	–	–	–	–	–
Naphthalene	–	–	–	2.93E+04	–	–	–	1.26E+03
N-nitrosodiphenylamine	3.35E+02	3.35E+03	3.35E+04	–	2.01E+01	2.01E+02	2.01E+03	–
Phenanthrene	–	–	–	–	–	–	–	–
Pyrene	–	–	–	2.86E+04	–	–	–	1.84E+02
Chlordane	1.94E+00	1.94E+01	1.94E+02	8.48E+01	4.71E-03	4.71E-02	4.71E-01	1.57E-01
Dieldrin	1.28E-01	1.28E+00	1.28E+01	4.40E+01	1.43E-03	1.43E-02	1.43E-01	4.90E-01
DDD	1.06E+01	1.06E+02	1.06E+03	–	2.50E-02	2.50E-01	2.50E+00	–
DDE	7.64E+00	7.64E+01	7.64E+02	–	1.52E-02	1.52E-01	1.52E+00	–
DDT	8.61E+00	8.61E+01	8.61E+02	9.27E+02	7.03E-03	7.03E-02	7.03E-01	5.12E-01
Endrin	–	–	–	3.13E+02	–	–	–	9.95E-01
PCB-1260	3.60E-02	3.60E-01	3.60E+00	–	4.29E-04	4.29E-03	4.29E-02	–

'–' indicates that the relevant health effects criteria are unavailable.
* - Replaces original Table 8-25 in the Final Baseline RA; Dames & Moore, 1992a.
** - New contaminant of concern with the addition of followup fieldwork results.
(a) - PRGs are calculated only for the inorganic analytes for which fate and transport data (e.g., uptake factors and transfer coefficients) exist.

TABLE 8-26*

Preliminary Remediation Goals (PRGs)
Exposure Pathway 12--Consumption of Crops
Residential Land Use Scenario

Analyte (a)	Soil PRGs (mg/kg) at Target Risk Levels: Risk = 1.0E-06	Risk = 1.0E-05	Risk = 1.0E-04	Soil PRGs (mg/kg) Hazard Index = 1.0	Water PRGs (mg/l) at Target Risk Levels: Risk = 1.0E-06	Risk = 1.0E-05	Risk = 1.0E-04	Water PRGs (mg/l) Hazard Index = 1.0
Arsenic	2.74E-01	2.74E+00	2.74E+01	6.16E+01	3.04E-02	3.04E-01	3.04E+00	6.84E+00
Beryllium	4.46E-01	4.46E+00	4.46E+01	4.11E+03	4.95E-02	4.95E-01	4.95E+00	4.56E+02
Cadmium	--	--	--	1.37E+01	--	--	--	1.52E+00
Chromium	--	--	--	4.11E+03	--	--	--	4.56E+02
Lead	--	--	--	--	--	--	--	--
Mercury	--	--	--	2.74E+00	--	--	--	3.04E-01
Nickel	--	--	--	3.29E+02	--	--	--	3.65E+01
135TNB	--	--	--	5.08E-03	--	--	--	5.64E-04
13DNB	--	--	--	1.54E-02	--	--	--	1.72E-03
246TNT	2.37E-02	2.37E-01	2.37E+00	1.52E-01	2.63E-06	2.63E-05	2.63E-04	1.69E-05
24DNT	1.01E-03	1.01E-02	1.01E-01	5.91E-01	1.13E-07	1.13E-06	1.13E-05	6.56E-05
26DNT	9.00E-04	9.00E-03	9.00E-02	2.62E-01	1.00E-07	1.00E-06	1.00E-05	2.92E-05
HMX	--	--	--	1.50E+00	--	--	--	1.67E-04
NB	--	--	--	1.24E-01	--	--	--	1.38E-05
RDX	1.38E-03	1.38E-02	1.38E-01	1.96E-01	1.54E-07	1.54E-06	1.54E-05	2.17E-05
Tetryl	--	--	--	1.91E+00	--	--	--	2.12E-04
Benzene	2.91E-02	2.91E-01	2.91E+00	--	3.23E-06	3.23E-05	3.23E-04	--
Tetrachloroethylene	6.34E-02	6.34E-01	6.34E+00	1.36E+01	7.04E-06	7.04E-05	7.04E-04	1.54E-03
** 1,1,1-Trichloroethane	--	--	--	6.25E+01	--	--	--	6.83E-08
Trichloroethylene	9.47E-02	9.47E-01	9.47E+00	--	1.05E-05	1.05E-04	1.05E-03	--
Xylenes	--	--	--	2.84E+03	--	--	--	3.15E-01
Anthracene	--	--	--	2.37E+03	--	--	--	2.63E-01
Benzo(a)anthracene	1.49E-02	1.49E-01	1.49E+00	--	1.66E-06	1.66E-05	1.66E-04	--
** Benzo(a)pyrene	2.64E-02	2.64E-01	2.64E+00	--	2.94E-06	2.94E-05	2.94E-04	--
Benzo(b)fluoranthene	2.64E-02	2.64E-01	2.64E+00	--	2.94E-06	2.94E-05	2.94E-04	--
** Benzo(ghi)perylene	--	--	--	--	--	--	--	--
Benzo(k)fluoranthene	7.65E-02	7.65E-01	7.65E+00	--	8.50E-06	8.50E-05	8.50E-04	--
Bis(2-ethylhexyl) phthalate	2.34E+00	2.34E+01	2.34E+02	2.81E+02	2.60E-04	2.60E-03	2.60E-02	3.12E-02
Chrysene	1.49E-02	1.49E-01	1.49E+00	--	1.66E-06	1.66E-05	1.66E-04	--
Dibenzofuran	--	--	--	--	--	--	--	--
Di-n-butyl phthalate	--	--	--	3.67E+03	--	--	--	4.07E-01
Fluoranthene	--	--	--	1.02E+03	--	--	--	1.13E-01
** Indeno(1,2,3-cd)pyrene	2.41E-02	2.41E-01	2.41E+00	--	2.66E-06	2.66E-05	2.66E-04	--
2-Methylnaphthalene	--	--	--	--	--	--	--	--
Naphthalene	--	--	--	7.62E+00	--	--	--	6.35E-04
N-nitrosodiphenylamine	6.51E-01	6.51E+00	6.51E+01	--	7.23E-05	7.23E-04	7.23E-03	--
Phenanthrene	--	--	--	--	--	--	--	--
Pyrene	--	--	--	4.34E+02	--	--	--	4.82E-02
Chlordane	6.07E-02	6.07E-01	6.07E+00	2.03E+00	6.74E-06	6.74E-05	6.74E-04	2.25E-04
Dieldrin	1.08E-03	1.08E-02	1.08E-01	3.70E-01	1.20E-07	1.20E-06	1.20E-05	4.11E-05
DDD	3.37E-01	3.37E+00	3.37E+01	--	3.74E-05	3.74E-04	3.74E-03	--
DDE	2.83E-01	2.83E+00	2.83E+01	--	3.15E-05	3.15E-04	3.15E-03	--
DDT	6.90E-01	6.90E+00	6.90E+01	5.03E+01	7.67E-05	7.67E-04	7.67E-03	5.59E-03
Endrin	--	--	--	7.75E+00	--	--	--	6.61E-04
PCB-1260	2.09E-02	2.09E-01	2.09E+00	--	2.32E-06	2.32E-05	2.32E-04	--

"--" - Indicates that the relevant health effects criteria are unavailable.
(a) - PRGs are only calculated for the inorganic analytes for which fate and transport data (e.g., uptake factors and transfer coefficients) exist.
* - replaces original Table 8-26 in the Final Baseline RA; Dames & Moore, 1992a.
** - New contaminant of concern with the addition of followup fieldwork results.

TABLE 8-27*

Summary of Preliminary Remediation Goals (PRGs) and Combined PRGs for Soil Due to Potential Exposure by Pathways 1, 2, 3, 11, and 12 Residential Land Use Scenario

	Pathway 1 PRGs (mg/kg) Dermal Absorption		Pathway 2 PRGs (mg/kg) Soil Ingestion		Pathway 3 PRGs (mg/kg) Dust Inhalation	
Analytes	Carcinogenic Risk=1E-06	Noncarcinogenic HI=1	Carcinogenic Risk=1E-06	Noncarcinogenic HI=1	Carcinogenic Risk=1E-06	Noncarcinogenic HI=1
Aluminum	**	**	–	2.74E+05	–	–
Antimony	**	**	–	1.10E+02	–	–
Arsenic	**	**	3.65E-01	8.21E+01	5.71E+01	–
Barium	**	**	–	1.92E+04	–	4.79E+04
Beryllium	**	**	1.49E-01	1.37E+03	9.51E+01	–
Cadmium	**	**	–	2.74E+02	1.27E+02	–
Calcium	**	**	–	–	–	–
Chromium	**	**	–	1.37E+03	1.90E+01	2.05E+02
Cobalt	**	**	–	2.74E+00	–	9.79E+04
Copper	**	**	–	1.01E+04	–	NA
Iron	**	**	–	–	–	NA
Lead	**	**	–	–	–	–
Magnesium	**	**	–	–	–	–
Manganese	**	**	–	2.74E+04	–	3.42E+04
Mercury	**	**	–	8.21E+01	–	3.08E+04
Nickel	**	**	–	5.48E+03	4.70E+02	–
Potassium	**	**	–	–	–	–
Selenium	**	**	–	1.37E+03	–	–
Silver	**	**	–	1.37E+03	–	–
Sodium	**	**	–	–	–	–
Thallium	**	**	–	2.19E+01	–	–
Vanadium	**	**	–	1.92E+03	–	–
Zinc	**	**	–	5.48E+04	–	–
Cyanide	**	**	–	5.48E+03	–	–
135TNB	–	1.14E+00	–	1.37E+01	–	–
13DNB	–	2.28E+00	–	2.74E+01	–	–
246TNT	1.77E+00	1.14E+01	2.13E+01	1.37E+02	–	–
24DNT	7.83E-02	4.56E+01	9.39E-01	5.48E+02	–	–
26DNT	7.83E-02	2.28E+01	9.39E-01	2.74E+02	–	–
HMX	–	1.14E+03	–	1.37E+04	–	–
NB	–	1.14E+01	–	1.37E+02	–	2.05E+05
RDX	(a)	(a)	5.81E+00	8.21E+02	–	–
Tetryl	–	2.28E+02	–	2.74E+03	–	–
Nitrite/Nitrate	**	**	–	4.38E+05	–	–
Tetrachloroethylene	**	**	1.25E+01	2.74E+03	4.44E+05	–
(b) **1,1,1-Trichloroethane**	**	**	–	**2.46E+04**	–	NA
Trichloroethylene	**	**	5.81E+01	–	1.33E+05	–
Xylenes	**	**	–	5.48E+05	–	NA
Anthracene	<>	<>	–	8.21E+04	–	–
Benzo(a)anthracene	<>	<>	1.10E-01	–	1.31E+02	–
(b) **Benzo(a)pyrene**	<>	<>	**1.10E-01**	–	**1.31E+02**	–
Benzo(b)fluoranthene	<>	<>	1.10E-01	–	1.31E+02	–
(b) **Benzo(ghi)perylene**	<>	<>	–	–	–	–
Benzo(k)fluoranthene	<>	<>	1.10E-01	–	1.31E+02	–
Bis(2-ethylhexyl) phthalate	<>	<>	4.56E+01	5.48E+03	–	–
Chrysene	<>	<>	1.10E-01	–	1.31E+02	–
Dibenzofuran	<>	<>	–	–	–	–
Di-n-butyl phthalate	<>	<>	–	2.74E+04	–	–
Fluoranthene	<>	<>	–	1.10E+04	–	–
(b) **Indeno(1,2,3-cd)pyrene**	<>	<>	**1.10E-01**	–	**1.31E+02**	–
2-Methylnaphthalene	<>	<>	–	–	–	–
Naphthalene	<>	<>	–	1.10E+03	–	–
N-nitrosodiphenylamine	<>	<>	1.30E+02	–	–	–
Phenanthrene	<>	<>	–	–	–	–
Pyrene	<>	<>	–	8.21E+03	–	–
Chlordane	<>	<>	4.91E-01	1.64E+01	6.15E+02	–
Dieldrin	<>	<>	3.99E-02	1.37E+01	4.99E+01	–
DDD	<>	<>	2.66E+00	–	–	–
DDE	<>	<>	1.88E+00	–	–	–
DDT	<>	<>	1.88E+00	1.37E+02	2.35E+03	–
Endrin	<>	<>	–	8.21E+01	–	–
PCB-1260	5.16E-02	–	8.30E-02	–	–	–

TABLE 8-27* (cont'd)

Summary of Preliminary Remediation Goals (PRGs) and Combined PRGs for Soil Due to Potential Exposure by Pathways 1, 2, 3, 11, and 12 Residential Land Use Scenario

	Pathway 11 PRGs (mg/kg) Beef and Milk Consumption		Pathway 12 PRGs (mg/kg) Consumption of Crops	
Analytes	**Carcinogenic Risk=1E-06**	**Noncarcinogenic HI=1**	**Carcinogenic Risk=1E-06**	**Noncarcinogenic HI=1**
Aluminum	XX	XX	XX	XX
Antimony	XX	XX	XX	XX
Arsenic	4.09E+01	1.24E+04	2.74E-01	6.16E+01
Barium	XX	XX	XX	XX
Beryllium	2.08E+02	NA	4.46E-01	4.11E+03
Cadmium	–	1.26E+03	–	1.37E+01
Calcium	XX	XX	XX	XX
Chromium	–	2.45E+05	–	4.11E+03
Cobalt	XX	XX	XX	XX
Copper	XX	XX	XX	XX
Iron	XX	XX	XX	XX
Lead	–	–	–	–
Magnesium	XX	XX	XX	XX
Manganese	XX	XX	XX	XX
Mercury	–	4.91E+01	–	2.74E+00
Nickel	–	1.97E+05	–	3.29E+02
Potassium	XX	XX	XX	XX
Selenium	XX	XX	XX	XX
Silver	XX	XX	XX	XX
Sodium	XX	XX	XX	XX
Thallium	XX	XX	XX	XX
Vanadium	XX	XX	XX	XX
Zinc	XX	XX	XX	XX
Cyanide	XX	XX	XX	XX
135TNB	–	2.48E+01	–	5.08E-03
13DNB	–	5.21E+01	–	1.54E-02
246TNT	4.46E+01	2.87E+02	2.37E-02	1.52E-01
24DNT	1.91E+00	1.11E+03	1.01E-03	5.91E-01
26DNT	1.92E+00	5.61E+02	9.00E-04	2.62E-01
HMX	–	2.10E+04	–	1.50E+00
NB	–	2.79E+02	–	1.24E-01
RDX	9.84E+00	1.39E+03	1.38E-03	1.96E-01
Tetryl	–	5.38E+03	–	1.91E+00
Nitrite/Nitrate	XX	XX	XX	XX
Tetrachloroethylene	3.21E+01	7.01E+03	6.34E-02	1.38E+01
(b) 1,1,1-Trichloroethane	–	**5.63E+04**	–	**5.25E+01**
Trichloroethylene	1.28E+02	–	9.47E-02	–
Xylenes	–	1.00E+06	–	2.84E+03
Anthracene	–	2.66E+05	–	2.37E+03
Benzo(a)anthracene	4.39E-01	–	1.49E-02	–
(b) Benzo(a)pyrene	**4.76E-01**	–	**2.64E-02**	–
Benzo(b)fluoranthene	4.75E-01	–	2.64E-02	–
(b) Benzo(ghi)perylene	–	–	–	–
Benzo(k)fluoranthene	5.49E-01	–	7.56E-02	–
Bis(2-ethylhexyl) phthalate	1.60E+02	1.92E+04	2.34E+00	2.81E+02
Chrysene	4.39E-01	–	1.49E-02	–
Dibenzofuran	–	–	–	–
Di-n-butyl phthalate	–	1.10E+05	–	3.67E+03
Fluoranthene	–	4.17E+04	–	1.02E+03
(b) Indeno(1,2,3-cd)pyrene	**4.70E-01**	–	**2.41E-02**	–
2-Methylnaphthalene	–	–	–	–
Naphthalene	–	2.93E+04	–	7.52E+00
N-nitrosodiphenylamine	3.35E+02	–	6.51E-01	–
Phenanthrene	–	–	–	–
Pyrene	–	2.89E+04	–	4.34E+02
Chlordane	1.94E+00	6.48E+01	6.07E-02	2.03E+00
Dieldrin	1.28E-01	4.40E+01	1.08E-03	3.70E-01
DDD	1.06E+01	–	3.37E-01	–
DDE	7.64E+00	–	2.83E-01	–
DDT	8.61E+00	6.27E+02	6.90E-01	5.03E+01
Endrin	–	3.13E+02	–	7.75E+00
PCB-1260	3.60E-02	–	2.09E-02	–

TABLE 8-27* (cont'd)

Summary of Preliminary Remediation Goals (PRGs) and Combined PRGs for Soil Due to Potential Exposure by Pathways 1, 2, 3, 11, and 12 Residential Land Use Scenario

	Combined PRGs (mg/kg)			
	Carcinogenic			Noncarcinogenic
Analytes	**Risk=1E-06**	**Risk=1E-05**	**Risk=1E-04**	**HI=1**
Aluminum	–	–	–	2.74E+05
Antimony	–	–	–	1.10E+02
Arsenic	1.55E-01	1.55E+00	1.55E+01	3.51E+01
Barium	–	–	–	1.37E+04
Beryllium	1.11E-01	1.11E+00	1.11E+01	NA
Cadmium	1.27E+02	1.27E+03	1.27E+04	1.29E+01
Calcium	–	–	–	–
Chromium	1.90E+01	1.90E+02	1.90E+03	1.71E+02
Cobalt	–	–	–	2.74E+00
Copper	–	–	–	1.01E+04
Iron	–	–	–	NA
Lead	–	–	–	–
Magnesium	–	–	–	–
Manganese	–	–	–	1.52E+04
Mercury	–	–	–	2.51E+00
Nickel	4.70E+02	4.70E+03	4.70E+04	3.09E+02
Potassium	–	–	–	–
Selenium	–	–	–	1.37E+03
Silver	–	–	–	1.37E+03
Sodium	–	–	–	–
Thallium	–	–	–	2.19E+01
Vanadium	–	–	–	1.92E+03
Zinc	–	–	–	5.48E+04
Cyanide	–	–	–	5.48E+03
135TNB	–	–	–	5.05E-03
13DNB	–	–	–	1.53E-02
246TNT	2.33E-02	2.33E-01	2.33E+00	1.50E-01
24DNT	9.99E-04	9.99E-03	9.99E-02	5.83E-01
26DNT	8.89E-04	8.89E-03	8.89E-02	2.59E-01
HMX	–	–	–	1.50E+00
NB	–	–	–	1.23E-01
RDX	1.38E-03	1.38E-02	1.38E-01	1.95E-01
Tetryl	–	–	–	1.89E+00
Nitrite/Nitrate	–	–	–	4.38E+05
Tetrachloroethylene	6.29E-02	6.29E-01	6.29E+00	1.38E+01
(b) 1,1,1-Trichloroethane	–	–	–	5.23E+01
Trichloroethylene	9.45E-02	9.45E-01	9.45E+00	–
Xylenes	–	–	–	NA
Anthracene	–	–	–	2.28E+03
Benzo(a)anthracene	1.27E-02	1.27E-01	1.27E+00	–
(b) Benzo(a)pyrene	2.04E-02	2.04E-01	2.04E+00	–
Benzo(b)fluoranthene	2.04E-02	2.04E-01	2.04E+00	–
(b) Benzo(ghi)perylene	–	–	–	–
Benzo(k)fluoranthene	4.14E-02	4.14E-01	4.14E+00	–
Bis(2-ethylhexyl) phthalate	2.20E+00	2.20E+01	2.20E+02	2.63E+02
Chrysene	1.27E-02	1.27E-01	1.27E+00	–
Dibenzofuran	–	–	–	–
Di-n-butyl phthalate	–	–	–	3.14E+03
Fluoranthene	–	–	–	9.13E+02
(b) Indeno(1,2,3-cd)pyrene	1.90E-02	1.90E-01	1.90E+00	–
2-Methylnaphthalene	–	–	–	–
Naphthalene	–	–	–	7.47E+00
N-nitrosodiphenylamine	6.46E-01	6.46E+00	6.46E+01	–
Phenanthrene	–	–	–	–
Pyrene	–	–	–	4.06E+02
Chlordane	5.25E-02	5.25E-01	5.25E+00	1.76E+00
Dieldrin	1.04E-03	1.04E-02	1.04E-01	3.57E-01
DDD	2.91E-01	2.91E+00	2.91E+01	–
DDE	2.38E-01	2.38E+00	2.38E+01	–
DDT	4.77E-01	4.77E+00	4.77E+01	3.47E+01
Endrin	–	–	–	6.92E+00
PCB-1260	9.34E-03	9.34E-02	9.34E-01	–

"–" - Indicates that the relevant health effects criteria are unavailable.
"***" - Not calculated because dermal absorption of inorganic and volatile organic contaminants is assumed to be negligible (USEPA, 1991c; USEPA, 1992a).
"XX" - Not calculated because quantitative information on uptake factors is not available.
"<>" - Not calculated because dermal absorption data are not available.
(a) - PRGs are not determined for RDX for this exposure pathway because of insufficient evidence of dermal absorption in humans.
(b) - New contaminant of concern with the addition of followup fieldwork results.
HI - Hazard Index
NA - Not applicable because the calculated PRG is greater than one million parts per million (mg/kg).
* - Replaces original Table 8-27 in the Final Baseline RA; Dames & Moore, 1992a.

TABLE 8-29*

Summary of Preliminary Remediation Goals (PRGs) and ombined PRGs for Soil Due to Potential Exposure by Pathways 1, 2, and 3 Residential Land Use Scenario

	Pathway 1 PRGs (mg/kg) Dermal Absorption		Pathway 2 PRGs (mg/kg) Soil Ingestion		Pathway 3 PRGs (mg/kg) Dust Inhalation	
	Carcinogenic	Noncarcinogenic	Carcinogenic	Noncarcinogenic	Carcinogenic	Noncarcinogenic
Analytes	Risk=1E-06	HI=1	Risk=1E-06	HI=1	Risk=1E-06	HI=1
Aluminum	**	**	–	2.74E+05	–	–
Antimony	**	**	–	1.10E+02	–	–
Arsenic	**	**	3.86E-01	8.21E+01	5.71E+01	–
Barium	**	**	–	1.92E+04	–	4.79E+04
Beryllium	**	**	1.49E-01	1.37E+03	9.51E+01	–
Cadmium	**	**	–	2.74E+02	1.27E+02	–
Calcium	**	**	–	–	–	–
Chromium	**	**	–	1.37E+03	1.90E+01	2.05E+02
Cobalt	**	**	–	2.74E+00	–	9.79E+04
Copper	**	**	–	1.01E+04	–	NA
Iron	**	**	–	–	–	NA
Lead	**	**	–	–	–	–
Magnesium	**	**	–	–	–	–
Manganese	**	**	–	2.74E+04	–	3.42E+04
Mercury	**	**	–	8.21E+01	–	3.08E+04
Nickel	**	**	–	5.48E+03	4.70E+02	–
Potassium	**	**	–	–	–	–
Selenium	**	**	–	1.37E+03	–	–
Silver	**	**	–	1.37E+03	–	–
Sodium	**	**	–	–	–	–
Thallium	**	**	–	2.19E+01	–	–
Vanadium	**	**	–	1.92E+03	–	–
Zinc	**	**	–	5.48E+04	–	–
Cyanide	**	**	–	5.48E+03	–	–
135TNB	–	1.14E+00	–	1.37E+01	–	–
13DNB	–	2.28E+00	–	2.74E+01	–	–
246TNT	1.77E+00	1.14E+01	2.13E+01	1.37E+02	–	–
24DNT	7.83E-02	4.56E+01	9.39E-01	5.48E+02	–	–
26DNT	7.83E-02	2.28E+01	9.39E-01	2.74E+02	–	–
HMX	–	1.14E+03	–	1.37E+04	–	–
NB	–	1.14E+01	–	1.37E+02	–	2.05E+05
RDX	(a)	(a)	5.81E+00	8.21E+02	–	–
Tetryl	–	2.28E+02	–	2.74E+03	–	–
Nitrite/Nitrate	**	**	–	4.38E+05	–	–
Tetrachloroethylene	**	**	1.25E+01	2.74E+03	4.44E+05	–
(b) 1,1,1-Trichloroethane	**	**	–	2.46E+04	–	NA
Trichloroethylene	**	**	5.81E+01	–	1.33E+05	–
Xylenes	**	**	–	5.48E+05	–	NA
Anthracene	◇	◇	–	8.21E+04	–	–
Benzo(a)anthracene	◇	◇	1.10E-01	–	1.31E+02	–
(b) Benzo(a)pyrene	◇	◇	1.10E-01	–	1.31E+02	–
Benzo(b)fluoranthene	◇	◇	1.10E-01	–	1.31E+02	–
(b) Benzo(ghi)perylene	◇	◇	–	–	–	–
Benzo(k)fluoranthene	◇	◇	1.10E-01	–	1.31E+02	–
Bis(2-ethylhexyl) phthalate	◇	◇	4.56E+01	5.48E+03	–	–
Chrysene	◇	◇	1.10E-01	–	1.31E+02	–
Dibenzofuran	◇	◇	–	–	–	–
Di-n-butyl phthalate	◇	◇	–	2.74E+04	–	–
Fluoranthene	◇	◇	–	1.10E+04	–	–
(b) Indeno(1,2,3-cd)pyrene	◇	◇	1.10E-01	–	1.31E+02	–
2-Methylnaphthalene	◇	◇	–	–	–	–
Naphthalene	◇	◇	–	1.10E+03	–	–
N-nitrosodiphenylamine	◇	◇	1.30E+02	–	–	–
Phenanthrene	◇	◇	–	–	–	–
Pyrene	◇	◇	–	8.21E+03	–	–
Chlordane	◇	◇	4.91E-01	1.64E+01	6.15E+02	–
Dieldrin	◇	◇	3.99E-02	1.37E+01	4.99E+01	–
DDD	◇	◇	2.66E+00	–	–	–
DDE	◇	◇	1.88E+00	–	–	–
DDT	◇	◇	1.88E+00	1.37E+02	2.35E+03	–
Endrin	◇	◇	–	8.21E+01	–	–
PCB-1260	5.16E-02	–	8.30E-02	–	–	–

TABLE 8-29* (cont'd)

Summary of Preliminary Remediation Goals (PRGs) and Combined PRGs for Soil Due to Potential Exposure by Pathways 1, 2, and 3 Residential Land Use Scenario

Analytes	Combined PRGs (mg/kg) Carcinogenic Risk=1E-06	Carcinogenic Risk=1E-05	Carcinogenic Risk=1E-04	Noncarcinogenic HI=1
Aluminum	–	–	–	2.74E+05
Antimony	–	–	–	1.10E+02
Arsenic	3.63E-01	3.63E+00	3.63E+01	8.21E+01
Barium	–	–	–	1.37E+04
Beryllium	1.48E-01	1.48E+00	1.48E+01	1.37E+03
Cadmium	1.27E+02	1.27E+03	1.27E+04	2.74E+02
Calcium	–	–	–	–
Chromium	1.90E+01	1.90E+02	1.90E+03	1.79E+02
Cobalt	–	–	–	2.74E+00
Copper	–	–	–	1.01E+04
Iron	–	–	–	NA
Lead	–	–	–	–
Magnesium	–	–	–	–
Manganese	–	–	–	1.52E+04
Mercury	–	–	–	8.19E+01
Nickel	4.70E+02	4.70E+03	4.70E+04	5.48E+03
Potassium	–	–	–	–
Selenium	–	–	–	1.37E+03
Silver	–	–	–	1.37E+03
Sodium	–	–	–	–
Thallium	–	–	–	2.19E+01
Vanadium	–	–	–	1.92E+03
Zinc	–	–	–	5.48E+04
Cyanide	–	–	–	5.48E+03
135TNB	–	–	–	1.05E+00
13DNB	–	–	–	2.11E+00
246TNT	1.64E+00	1.64E+01	1.64E+02	1.05E+01
24DNT	7.23E-02	7.23E-01	7.23E+00	4.21E+01
26DNT	7.23E-02	7.23E-01	7.23E+00	2.11E+01
HMX	–	–	–	1.05E+03
NB	–	–	–	1.05E+01
RDX	5.81E+00	5.81E+01	5.81E+02	8.21E+02
Tetryl	–	–	–	2.11E+02
Nitrite/Nitrate	–	–	–	4.38E+05
Tetrachloroethylene	1.25E+01	1.25E+02	1.25E+03	2.74E+03
(b) 1,1,1-Trichloroethane	–	–	–	2.48E+04
Trichloroethylene	5.80E+01	5.80E+02	5.80E+03	–
Xylenes	–	–	–	5.48E+05
Anthracene	–	–	–	8.21E+04
Benzo(a)anthracene	1.10E-01	1.10E+00	1.10E+01	–
(b) Benzo(a)pyrene	1.10E-01	1.10E+00	1.10E+01	–
Benzo(b)fluoranthene	1.10E-01	1.10E+00	1.10E+01	–
(b) Benzo(ghi)perylene	–	–	–	–
Benzo(k)fluoranthene	1.10E-01	1.10E+00	1.10E+01	–
Bis(2-ethylhexyl) phthalate	4.56E+01	4.56E+02	4.56E+03	5.48E+03
Chrysene	1.10E-01	1.10E+00	1.10E+01	–
Dibenzofuran	–	–	–	–
Di-n-butyl phthalate	–	–	–	2.74E+04
Fluoranthene	–	–	–	1.10E+04
(b) Indeno(1,2,3-cd)pyrene	1.10E-01	1.10E+00	1.10E+01	–
2-Methylnaphthalene	–	–	–	–
Naphthalene	–	–	–	1.10E+03
N-nitrosodiphenylamine	1.30E+02	1.30E+03	1.30E+04	–
Phenanthrene	–	–	–	–
Pyrene	–	–	–	8.21E+03
Chlordane	4.91E-01	4.91E+00	4.91E+01	1.64E+01
Dieldrin	3.99E-02	3.99E-01	3.99E+00	1.37E+01
DDD	2.66E+00	2.66E+01	2.66E+02	–
DDE	1.88E+00	1.88E+01	1.88E+02	–
DDT	1.88E+00	1.88E+01	1.88E+02	1.37E+02
Endrin	–	–	–	8.21E+01
PCB-1260	8.30E-02	8.30E-01	8.30E+00	–

"–" - Indicates that the relevant health effects criteria are unavailable.
"---" - Not calculated because dermal absorption of inorganic and volatile organic contaminants is assumed to be negligible (USEPA, 1991c; USEPA, 1992a).
"<>" - Not calculated because dermal absorption data are not available.
(a) - PRGs are not determined for RDX for this exposure pathway because of insufficient evidence of dermal absorption in humans.
(b) - New contaminant of concern with the addition of followup fieldwork results.
HI - Hazard Index
NA - Not applicable because the calculated PRG is greater than one million parts per million (mg/kg).
* - Replaces original Table 8-29 in the Final Baseline RA; Dames & Moore, 1992a.

TABLE 8-31*

Summary of Preliminary Remediation Goals (PRGs) and Combined PRGs for Soil Due to Potential Exposure by Pathways 1, 2, and 3 Light Industrial Land Use Scenario

	Pathway 1 PRGs (mg/kg) Dermal Absorption		Pathway 2 PRGs (mg/kg) Soil Ingestion		Pathway 3 PRGs (mg/kg) Dust Inhalation	
	Carcinogenic	Noncarcinogenic	Carcinogenic	Noncarcinogenic	Carcinogenic	Noncarcinogenic
Analytes	Risk=1E-06	HI=1	Risk=1E-06	HI=1	Risk=1E-06	HI=1
Aluminum	**	**	–	NA	–	–
Antimony	**	**	–	8.18E+02	–	–
Arsenic	**	**	3.27E+00	6.13E+02	1.24E+00	–
Barium	**	**	–	1.43E+05	–	8.66E+02
Beryllium	**	**	1.33E+00	1.02E+04	2.06E+00	–
Cadmium	**	**	–	2.04E+03	2.75E+00	–
Calcium	**	**	–	–	–	–
Chromium	**	**	–	1.02E+04	4.13E-01	3.71E+00
Cobalt	**	**	–	2.04E+01	–	1.77E+03
Copper	**	**	–	7.56E+04	–	6.19E+04
Iron	**	**	–	–	–	5.32E+04
Lead	**	**	–	–	–	–
Magnesium	**	**	–	–	–	–
Manganese	**	**	–	2.04E+05	–	6.19E+02
Mercury	**	**	–	6.13E+02	–	5.57E+02
Nickel	**	**	–	4.09E+04	1.02E+01	–
Potassium	**	**	–	–	–	–
Selenium	**	**	–	1.02E+04	–	–
Silver	**	**	–	1.02E+04	–	–
Sodium	**	**	–	–	–	–
Thallium	**	**	–	1.64E+02	–	–
Vanadium	**	**	–	1.43E+04	–	–
Zinc	**	**	–	4.09E+05	–	–
Cyanide	**	**	–	4.09E+04	–	–
135TNB	–	2.32E+00	–	1.02E+02	–	–
13DNB	–	4.65E+00	–	2.04E+02	–	–
246TNT	4.34E+00	2.32E+01	1.91E+02	1.02E+03	–	–
24DNT	1.91E-01	9.29E+01	8.42E+00	4.09E+03	–	–
26DNT	1.91E-01	4.65E+01	8.42E+00	2.04E+03	–	–
HMX	–	2.32E+03	–	1.02E+05	–	–
NB	–	2.32E+01	–	1.02E+03	–	3.71E+03
RDX	(a)	(a)	5.20E+01	6.13E+03	–	–
Tetryl	–	4.65E+02	–	2.04E+04	–	–
Nitrite/Nitrate	**	**	–	NA	–	–
Tetrachloroethylene	**	**	1.12E+02	2.04E+04	9.63E+03	–
(b) 1,1,1-Trichloroethane	**	**	–	1.84E+05	–	NA
Trichloroethylene	**	**	5.20E+02	–	2.89E+03	–
Xylenes	**	**	–	NA	–	6.19E+05
Anthracene	<>	<>	–	6.13E+05	–	–
Benzo(a)anthracene	<>	<>	9.87E-01	–	2.84E+00	–
(b) Benzo(a)pyrene	<>	<>	9.87E-01	–	2.84E+00	–
Benzo(b)fluoranthene	<>	<>	9.87E-01	–	2.84E+00	–
(b) Benzo(ghi)perylene	<>	<>	–	–	–	–
Benzo(k)fluoranthene	<>	<>	9.87E-01	–	2.84E+00	–
Bis(2-ethylhexyl) phthalate	<>	<>	4.09E+02	4.09E+04	–	–
Chrysene	<>	<>	9.87E-01	–	2.84E+00	–
Dibenzofuran	<>	<>	–	–	–	–
Di-n-butyl phthalate	<>	<>	–	2.04E+05	–	–
Fluoranthene	<>	<>	–	8.18E+04	–	–
(b) Indeno(1,2,3-cd)pyrene	<>	<>	9.87E-01	–	2.84E+00	–
2-Methylnaphthalene	<>	<>	–	–	–	–
Naphthalene	<>	<>	–	8.18E+03	–	–
N-nitrosodiphenylamine	<>	<>	1.17E+03	–	–	–
Phenanthrene	<>	<>	–	–	–	–
Pyrene	<>	<>	–	6.13E+04	–	–
Chlordane	<>	<>	4.40E+00	1.23E+02	1.33E+01	–
Dieldrin	<>	<>	3.58E-01	1.02E+02	1.08E+00	–
DDD	<>	<>	2.38E+01	–	–	–
DDE	<>	<>	1.68E+01	–	–	–
DDT	<>	<>	1.68E+01	1.02E+03	5.10E+01	–
Endrin	<>	<>	–	6.13E+02	–	–
PCB-1260	1.26E-01	–	7.43E-01	–	–	–

TABLE 8-31* (cont'd)

Summary of Preliminary Remediation Goals (PRGs) and Combined PRGs for Soil Due to Potential Exposure by Pathways 1, 2, and 3 Light Industrial Land Use Scenario

	Combined PRGs (mg/kg)			
	Carcinogenic			Noncarcinogenic
Analytes	Risk=1E-06	Risk=1E-05	Risk=1E-04	HI=1
Aluminum	--	--	--	NA
Antimony	--	--	--	8.18E+02
Arsenic	8.98E-01	8.98E+00	8.98E+01	6.13E+02
Barium	--	--	--	8.61E+02
Beryllium	8.09E-01	8.09E+00	8.09E+01	1.02E+04
Cadmium	2.75E+00	2.75E+01	2.75E+02	2.04E+03
Calcium	--	--	--	--
Chromium	4.13E-01	4.13E+00	4.13E+01	3.71E+00
Cobalt	--	--	--	2.02E+01
Copper	--	--	--	3.40E+04
Iron	--	--	--	5.32E+04
Lead	--	--	--	--
Magnesium	--	--	--	--
Manganese	--	--	--	6.17E+02
Mercury	--	--	--	2.92E+02
Nickel	1.02E+01	1.02E+02	1.02E+03	4.09E+04
Potassium	--	--	--	--
Selenium	--	--	--	1.02E+04
Silver	--	--	--	1.02E+04
Sodium	--	--	--	--
Thallium	--	--	--	1.64E+02
Vanadium	--	--	--	1.43E+04
Zinc	--	--	--	4.09E+05
Cyanide	--	--	--	4.09E+04
135TNB	--	--	--	2.27E+00
13DNB	--	--	--	4.54E+00
246TNT	4.24E+00	4.24E+01	4.24E+02	2.27E+01
24DNT	1.87E-01	1.87E+00	1.87E+01	9.08E+01
26DNT	1.87E-01	1.87E+00	1.87E+01	4.54E+01
HMX	--	--	--	2.27E+03
NB	--	--	--	2.26E+01
RDX	5.20E+01	5.20E+02	5.20E+03	6.13E+03
Tetryl	--	--	--	4.54E+02
Nitrite/Nitrate	--	--	--	NA
Tetrachloroethylene	1.11E+02	1.11E+03	1.11E+04	2.04E+04
(b) 1,1,1-Trichloroethane	--	--	--	1.84E+05
Trichloroethylene	4.41E+02	4.41E+03	4.41E+04	--
Xylenes	--	--	--	6.19E+05
Anthracene	--	--	--	6.13E+05
Benzo(a)anthracene	7.32E-01	7.32E+00	7.32E+01	--
(b) Benzo(a)pyrene	7.32E-01	7.32E+00	7.32E+01	--
Benzo(b)fluoranthene	7.32E-01	7.32E+00	7.32E+01	--
(b) Benzo(ghi)perylene	--	--	--	--
Benzo(k)fluoranthene	7.32E-01	7.32E+00	7.32E+01	--
Bis(2-ethylhexyl) phthalate	4.09E+02	4.09E+03	4.09E+04	4.09E+04
Chrysene	7.32E-01	7.32E+00	7.32E+01	--
Dibenzofuran	--	--	--	--
Di-n-butyl phthalate	--	--	--	2.04E+05
Fluoranthene	--	--	--	8.18E+04
(b) Indeno(1,2,3-cd)pyrene	7.32E-01	7.32E+00	7.32E+01	--
2-Methylnaphthalene	--	--	--	--
Naphthalene	--	--	--	8.18E+03
N-nitrosodiphenylamine	1.17E+03	1.17E+04	1.17E+05	--
Phenanthrene	--	--	--	--
Pyrene	--	--	--	6.13E+04
Chlordane	3.31E+00	3.31E+01	3.31E+02	1.23E+02
Dieldrin	2.69E-01	2.69E+00	2.69E+01	1.02E+02
DDD	2.38E+01	2.38E+02	2.38E+03	--
DDE	1.68E+01	1.68E+02	1.68E+03	--
DDT	1.27E+01	1.27E+02	1.27E+03	1.02E+03
Endrin	--	--	--	6.13E+02
PCB-1260	1.08E-01	1.08E+00	1.08E+01	--

"--" - Indicates that the relevant health effects criteria are unavailable.
"---" - Not calculated because dermal absorption of inorganic and volatile organic contaminants is assumed to be negligible (USEPA, 1991c; USEPA, 1992a).
"<>" - Not calculated because dermal absorption data are not available.
(a) - PRGs are not determined for RDX for this exposure pathway because of insufficient evidence of dermal absorption in humans.
(b) - New contaminant of concern with the addition of followup fieldwork results.
HI - Hazard Index
NA - Not applicable because the calculated PRG is greater than one million parts per million (mg/kg).
* - Replaces original Table 8-31 in the Final Baseline RA; Dames & Moore, 1992a.

TABLE 8-33*

Summary of Preliminary Remediation Goals (PRGs) and Combined PRGs for Soil Due to Potential Exposure by Pathways 1, 2, and 3 Military Land Use Scenario

	Pathway 1 PRGs (mg/kg) Dermal Absorption		Pathway 2 PRGs (mg/kg) Soil Ingestion		Pathway 3 PRGs (mg/kg) Dust Inhalation	
	Carcinogenic	Noncarcinogenic	Carcinogenic	Noncarcinogenic	Carcinogenic	Noncarcinogenic
Analytes	Risk=1E-06	HI=1	Risk=1E-06	HI=1	Risk=1E-06	HI=1
Aluminum	**	**	–	NA	–	–
Antimony	**	**	–	8.76E+02	–	–
Arsenic	**	**	2.92E+01	6.57E+02	1.11E+01	–
Barium	**	**	–	1.53E+05	–	9.28E+02
Beryllium	**	**	1.19E+01	1.10E+04	1.84E+01	–
Cadmium	**	**	–	2.19E+03	2.46E+01	–
Calcium	**	**	–	–	–	–
Chromium	**	**	–	1.10E+04	3.68E+00	3.98E+00
Cobalt	**	**	–	2.19E+01	–	1.90E+03
Copper	**	**	–	8.10E+04	–	6.63E+04
Iron	**	**	–	–	–	5.70E+04
Lead	**	**	–	–	–	–
Magnesium	**	**	–	–	–	
Manganese	**	**	–	2.19E+05	–	6.63E+02
Mercury	**	**	–	6.57E+02	–	5.97E+02
Nickel	**	**	–	4.38E+04	9.10E+01	–
Potassium	**	**	–	–	–	–
Selenium	**	**	–	1.10E+04	–	–
Silver	**	**	–	1.09E+04	–	–
Sodium	**	**	–	–	–	–
Thallium	**	**	–	1.75E+02	–	–
Vanadium	**	**	–	1.53E+04	–	–
Zinc	**	**	–	4.38E+05	–	–
Cyanide	**	**	–	4.38E+04	–	–
135TNB	–	2.49E+00	–	1.10E+02	–	–
13DNB	–	4.98E+00	–	2.19E+02	–	–
246TNT	3.87E+01	2.49E+01	1.70E+03	1.10E+03	–	–
24DNT	1.71E+00	9.95E+01	7.51E+01	4.38E+03	–	–
26DNT	1.71E+00	4.98E+01	7.51E+01	2.19E+03	–	–
HMX	–	2.49E+03	–	1.10E+05	–	–
NB	–	2.49E+01	–	1.10E+03	–	3.98E+03
RDX	(a)	(a)	4.65E+02	6.57E+03	–	–
Tetryl	–	4.98E+02	–	2.19E+04	–	–
Nitrite/Nitrate	**	**	–	NA	–	–
Tetrachloroethylene	**	**	1.00E+03	2.19E+04	8.59E+04	–
(b) 1,1,1-Trichloroethane	**	**	–	1.97E+05	–	NA
Trichloroethylene	**	**	4.65E+03	–	2.58E+04	–
Xylenes	**	**	–	NA	–	6.63E+05
Anthracene	<>	<>	–	6.57E+05	–	–
Benzo(a)anthracene	<>	<>	8.81E+00	–	2.54E+01	–
(b) Benzo(a)pyrene	<>	<>	8.81E+00	–	2.54E+01	–
Benzo(b)fluoranthene	<>	<>	8.81E+00	–	2.54E+01	–
(b) Benzo(ghi)perylene	<>	<>	–	–	–	–
Benzo(k)fluoranthene	<>	<>	8.81E+00	–	2.54E+01	–
Bis(2-ethylhexyl) phthlate	<>	<>	3.65E+03	4.38E+04	–	–
Chrysene	<>	<>	8.81E+00	–	2.54E+01	–
Dibenzofuran	<>	<>	–	–	–	–
Di-n-butyl phthalate	<>	<>	–	2.19E+05	–	–
Fluoranthene	<>	<>	–	8.76E+04	–	–
(b) Indeno(1,2,3-cd)pyrene	<>	<>	8.81E+00	–	2.54E+01	–
2-Methylnaphthalene	<>	<>	–	–	–	–
Naphthalene	<>	<>	–	8.76E+03	–	–
N-nitrosodiphenylamine	<>	<>	1.04E+04	–	–	–
Phenanthrene	<>	<>	–	–	–	–
Pyrene	<>	<>	–	6.57E+04	–	–
Chlordane	<>	<>	3.93E+01	1.31E+02	1.19E+02	–
Dieldrin	<>	<>	3.19E+00	1.10E+02	9.67E+00	–
DDD	<>	<>	2.13E+02	–	–	–
DDE	<>	<>	1.50E+02	–	–	–
DDT	<>	<>	1.50E+02	1.10E+03	4.55E+02	–
Endrin	<>	<>	–	6.57E+02	–	–
PCB-1260	1.13E+00	–	6.64E+00	–	–	–

TABLE 8-33* (cont'd)

Summary of Preliminary Remediation Goals (PRGs) and Combined PRGs for Soil Due to Potential Exposure by Pathways 1, 2, and 3 Military Land Use Scenario

	Combined PRGs (mg/kg)			
	Carcinogenic			Noncarcinogenic
Analytes	Risk=1E-06	Risk=1E-05	Risk=1E-04	HI=1
Aluminum	–	–	–	NA
Antimony	–	–	–	8.76E+02
Arsenic	8.02E+00	8.02E+01	8.02E+02	6.57E+02
Barium	–	–	–	9.23E+02
Beryllium	7.22E+00	7.22E+01	7.22E+02	1.10E+04
Cadmium	2.46E+01	2.46E+02	2.46E+03	2.19E+03
Calcium	–	–	–	–
Chromium	3.68E+00	3.68E+01	3.68E+02	3.98E+00
Cobalt	–	–	–	2.16E+01
Copper	–	–	–	3.65E+04
Iron	–	–	–	5.70E+04
Lead	–	–	–	–
Magnesium	–	–	–	–
Manganese	–	–	–	6.61E+02
Mercury	–	–	–	3.13E+02
Nickel	9.10E+01	9.10E+02	9.10E+03	4.38E+04
Potassium	–	–	–	–
Selenium	–	–	–	1.10E+04
Silver	–	–	–	1.09E+04
Sodium	–	–	–	–
Thallium	–	–	–	1.75E+02
Vanadium	–	–	–	1.53E+04
Zinc	–	–	–	4.38E+05
Cyanide	–	–	–	4.38E+04
135TNB	–	–	–	2.43E+00
13DNB	–	–	–	4.87E+00
246TNT	3.79E+01	3.79E+02	3.79E+03	2.43E+01
24DNT	1.67E+00	1.67E+01	1.67E+02	9.73E+01
26DNT	1.67E+00	1.67E+01	1.67E+02	4.87E+01
HMX	–	–	–	2.43E+03
NB	–	–	–	2.42E+01
RDX	4.65E+02	4.65E+03	4.65E+04	6.57E+03
Tetryl	–	–	–	4.87E+02
Nitrite/Nitrate	–	–	–	NA
Tetrachloroethylene	9.90E+02	9.90E+03	9.90E+04	2.19E+04
(b) **1,1,1-Trichloroethane**	–	–	–	1.97E+05
Trichloroethylene	3.94E+03	3.94E+04	3.94E+05	–
Xylenes	–	–	–	6.63E+05
Anthracene	–	–	–	6.57E+05
Benzo(a)anthracene	6.54E+00	6.54E+01	6.54E+02	–
(b) **Benzo(a)pyrene**	6.54E+00	6.54E+01	6.54E+02	–
Benzo(b)fluoranthene	6.54E+00	6.54E+01	6.54E+02	–
(b) **Benzo(ghi)perylene**	–	–	–	–
Benzo(k)fluoranthene	6.54E+00	6.54E+01	6.54E+02	–
Bis(2-ethylhexyl) phthlate	3.65E+03	3.65E+04	3.65E+05	4.38E+04
Chrysene	6.54E+00	6.54E+01	6.54E+02	–
Dibenzofuran	–	–	–	–
Di-n-butyl phthalate	–	–	–	2.19E+05
Fluoranthene	–	–	–	8.76E+04
(b) **Indeno(1,2,3-cd)pyrene**	6.54E+00	6.54E+01	6.54E+02	–
2-Methylnaphthalene	–	–	–	–
Naphthalene	–	–	–	8.76E+03
N-nitrosodiphenylamine	1.04E+04	1.04E+05	1.04E+06	–
Phenanthrene	–	–	–	–
Pyrene	–	–	–	6.57E+04
Chlordane	2.95E+01	2.95E+02	2.95E+03	1.31E+02
Dieldrin	2.40E+00	2.40E+01	2.40E+02	1.10E+02
DDD	2.13E+02	2.13E+03	2.13E+04	–
DDE	1.50E+02	1.50E+03	1.50E+04	–
DDT	1.13E+02	1.13E+03	1.13E+04	1.10E+03
Endrin	–	–	–	6.57E+02
PCB-1260	9.66E-01	9.66E+00	9.66E+01	–

"–" - Indicates that the relevant health effects criteria are unavailable.
"***" - Not calculated because dermal absorption of inorganic and volatile organic contaminants is assumed to be negligible (USEPA, 1991c; USEPA, 1992a).
"<>" - Not calculated because dermal absorption data are not available.
(a) - PRGs are not determined for RDX for this exposure pathway because of insufficient evidence of dermal absorption in humans.
(b) - **New contaminant of concern with the addition of followup fieldwork results.**
HI - Hazard Index
NA - Not applicable because the calculated PRG is greater than one million parts per million (mg/kg).
* - Replaces original Table 8-33 in the Final Baseline RA; Dames & Moore, 1992a.

TABLE 8-35*

Summary of Preliminary Remediation Goals (PRGs) and Combined PRGs for Soil Due to Potential Exposure by Pathways 1, 2, and 3 Construction Land Use Scenario

	Pathway 1 PRGs (mg/kg) Dermal Absorption		Pathway 2 PRGs (mg/kg) Soil Ingestion		Pathway 3 PRGs (mg/kg) Dust Inhalation	
	Carcinogenic	Noncarcinogenic	Carcinogenic	Noncarcinogenic	Carcinogenic	Noncarcinogenic
Analytes	Risk=1E-06	HI=1	Risk=1E-06	HI=1	Risk=1E-06	HI=1
Aluminum	**	**	--	9.24E+05	--	--
Antimony	**	**	--	1.27E+02	--	--
Arsenic	**	**	6.37E+00	9.56E+01	1.54E+01	--
Barium	**	**	--	2.23E+04	--	8.65E+02
Beryllium	**	**	2.59E+00	1.59E+03	2.57E+01	--
Cadmium	**	**	--	3.19E+02	3.43E+01	--
Calcium	**	**	--	--	--	--
Chromium	**	**	--	1.59E+03	5.15E+00	3.71E+00
Cobalt	**	**	--	3.19E+00	--	1.77E+03
Copper	**	**	--	1.18E+04	--	6.18E+04
Iron	**	**	--	--	--	5.31E+04
Lead	**	**	--	--	--	--
Magnesium	**	**	--	--	--	--
Manganese	**	**	--	3.19E+04	--	6.18E+02
Mercury	**	**	--	9.56E+01	--	5.56E+02
Nickel	**	**	--	6.37E+03	1.27E+02	--
Potassium	**	**	--	--	--	--
Selenium	**	**	--	1.59E+03	--	--
Silver	**	**	--	1.59E+03	--	--
Sodium	**	**	--	--	--	--
Thallium	**	**	--	2.55E+01	--	--
Vanadium	**	**	--	2.23E+03	--	--
Zinc	**	**	--	6.37E+04	--	--
Cyanide	**	**	--	6.37E+03	--	--
135TNB	--	3.48E+00	--	1.59E+01	--	--
13DNB	--	6.95E+00	--	3.19E+01	--	--
246TNT	8.11E+01	3.48E+01	3.72E+02	1.59E+02	--	--
24DNT	3.58E+00	1.39E+02	1.64E+01	6.37E+02	--	--
26DNT	3.58E+00	6.95E+01	1.64E+01	3.19E+02	--	--
HMX	--	3.48E+03	--	1.59E+04	--	--
NB	--	3.48E+01	--	1.59E+02	--	3.71E+03
RDX	(a)	(a)	1.01E+02	9.56E+02	--	--
Tetryl	--	6.95E+02	--	3.19E+03	--	--
Nitrite/Nitrate	**	**	--	5.10E+05	--	--
Tetrachloroethylene	**	**	2.19E+02	3.19E+03	1.20E+05	--
1,1,1-Trichloroethane	**	**	--	2.87E+04	--	NA
Trichloroethylene	**	**	1.01E+03	--	3.60E+04	--
Xylenes	**	**	--	6.37E+05	--	6.18E+05
Anthracene	<>	<>	--	9.56E+04	--	--
Benzo(a)anthracene	<>	<>	1.92E+00	--	3.54E+01	--
(b) Benzo(a)pyrene	<>	<>	1.92E+00	--	3.54E+01	--
Benzo(b)fluoranthene	<>	<>	1.92E+00	--	3.54E+01	--
(b) Benzo(ghi)perylene	<>	<>	--	--	--	--
Benzo(k)fluoranthene	<>	<>	1.92E+00	--	3.54E+01	--
Bis(2-ethylhexyl) phthalate	<>	<>	7.97E+02	6.37E+03	--	--
Chrysene	<>	<>	1.92E+00	--	3.54E+01	--
Dibenzofuran	<>	<>	--	--	--	--
Di-n-butyl phthalate	<>	<>	--	3.19E+04	--	--
Fluoranthene	<>	<>	--	1.27E+04	--	--
(b) Indeno(1,2,3-cd)pyrene	<>	<>	1.92E+00	--	3.54E+01	--
2-Methylnaphthalene	<>	<>	--	--	--	--
Naphthalene	<>	<>	--	1.27E+03	--	--
N-nitrosodiphenylamine	<>	<>	2.28E+03	--	--	--
Phenanthrene	<>	<>	--	--	--	--
Pyrene	<>	<>	--	9.56E+03	--	--
Chlordane	<>	<>	8.58E+00	1.91E+01	1.66E+02	--
Dieldrin	<>	<>	6.97E-01	1.59E+01	1.35E+01	--
DDD	<>	<>	4.65E+01	--	--	--
DDE	<>	<>	3.28E+01	--	--	--
DDT	<>	<>	3.28E+01	1.59E+02	6.36E+02	--
Endrin	<>	<>	--	9.56E+01	--	--
PCB-1260	2.36E+00	--	1.45E+00	--	--	--

TABLE 8-35* (cont'd)

Summary of Preliminary Remediation Goals (PRGs) and Combined PRGs for Soil Due to Potential Exposure by Pathways 1, 2, and 3 Construction Land Use Scenario

	Combined PRGs (mg/kg)			
	Carcinogenic			Noncarcinogenic
Analytes	Risk=1E-06	Risk=1E-05	Risk=1E-04	HI=1
Aluminum	--	--	--	9.24E+05
Antimony	--	--	--	1.27E+02
Arsenic	4.51E+00	4.51E+01	4.51E+02	9.56E+01
Barium	--	--	--	8.32E+02
Beryllium	2.36E+00	2.36E+01	2.36E+02	1.59E+03
Cadmium	3.43E+01	3.43E+02	3.43E+03	3.19E+02
Calcium	--	--	--	--
Chromium	5.15E+00	5.15E+01	5.15E+02	3.70E+00
Cobalt	--	--	--	3.18E+00
Copper	--	--	--	9.90E+03
Iron	--	--	--	5.31E+04
Lead	--	--	--	--
Magnesium	--	--	--	--
Manganese	--	--	--	6.06E+02
Mercury	--	--	--	8.16E+01
Nickel	1.27E+02	1.27E+03	1.27E+04	6.37E+03
Potassium	--	--	--	--
Selenium	--	--	--	1.59E+03
Silver	--	--	--	1.59E+03
Sodium	--	--	--	--
Thallium	--	--	--	2.55E+01
Vanadium	--	--	--	2.23E+03
Zinc	--	--	--	6.37E+04
Cyanide	--	--	--	6.37E+03
135TNB	--	--	--	2.85E+00
13DNB	--	--	--	5.71E+00
246TNT	6.66E+01	6.66E+02	6.66E+03	2.85E+01
24DNT	2.94E+00	2.94E+01	2.94E+02	1.14E+02
26DNT	2.94E+00	2.94E+01	2.94E+02	5.71E+01
HMX	--	--	--	2.85E+03
NB	--	--	--	2.83E+01
RDX	1.01E+02	1.01E+03	1.01E+04	9.56E+02
Tetryl	--	--	--	5.71E+02
Nitrite/Nitrate	--	--	--	5.10E+05
Tetrachloroethyene	2.18E+02	2.18E+03	2.18E+04	3.19E+03
1,1,1-Trichloroethane	--	--	--	2.87E+04
Trichloroethylene	9.86E+02	9.86E+03	9.86E+04	--
Xylenes	--	--	--	3.14E+05
Anthracene	--	--	--	9.56E+04
Benzo(a)anthracene	1.82E+00	1.82E+01	1.82E+02	--
(b) Benzo(a)pyrene	1.82E+00	1.82E+01	1.82E+02	--
Benzo(b)fluoranthene	1.82E+00	1.82E+01	1.82E+02	--
(b) Benzo(ghi)perylene	--	--	--	--
Benzo(k)fluoranthene	1.82E+00	1.82E+01	1.82E+02	--
Bis(2-ethylhexyl) phthalate	7.97E+02	7.97E+03	7.97E+04	6.37E+03
Chrysene	1.82E+00	1.82E+01	1.82E+02	--
Dibenzofuran	--	--	--	--
Di-n-butyl phthalate	--	--	--	3.19E+04
Fluoranthene	--	--	--	1.27E+04
(b) Indeno(1,2,3-cd)pyrene	1.82E+00	1.82E+01	1.82E+02	--
2-Methylnaphthalene	--	--	--	--
Naphthalene	--	--	--	1.27E+03
N-nitrosodiphenylamine	2.28E+03	2.28E+04	2.28E+05	--
Phenanthrene	--	--	--	--
Pyrene	--	--	--	9.56E+03
Chlordane	8.16E+00	8.16E+01	8.16E+02	1.91E+01
Dieldrin	6.63E-01	6.63E+00	6.63E+01	1.59E+01
DDD	4.65E+01	4.65E+02	4.65E+03	--
DDE	3.28E+01	3.28E+02	3.28E+03	--
DDT	3.12E+01	3.12E+02	3.12E+03	1.59E+02
Endrin	--	--	--	9.56E+01
PCB-1260	8.98E-01	8.98E+00	8.98E+01	--

"--" - Indicates that the relevant health effects criteria are unavailable.
"****" - Not calculated because dermal absorption of inorganic and volatile organic contaminants is assumed to be negligible (USEPA, 1991c; USEPA, 1992a).
"<>" - Not calculated because dermal absorption data are not available.
(a) - PRGs are not determined for RDX for this exposure pathway because of insufficient
(b) - New contaminant of concern with the addition of followup fieldwork results.
HI - Hazard Index
* - Replaces original Table 8-35 in the Final Baseline RA; Dames & Moore, 1992a.

TABLE 8-36*

Summary of Preliminary Remediation Goals (PRGs) and Combined PRGs for Soil Due to Potential Exposure by Pathways 1, 2, and 3 Agricultural Land Use Scenario

	Pathway 1 PRGs (mg/kg) Dermal Absorption		Pathway 2 PRGs (mg/kg) Soil Ingestion		Pathway 3 PRGs (mg/kg) Dust Inhalation	
Analytes	Carcinogenic Risk=1E-06	Noncarcinogenic HI=1	Carcinogenic Risk=1E-06	Noncarcinogenic HI=1	Carcinogenic Risk=1E-06	Noncarcinogenic HI=1
Aluminum	**	**	--	NA	--	--
Antimony	**	**	--	7.10E+02	--	--
Arsenic	**	**	1.77E+00	5.32E+02	2.65E+02	--
Barium	**	**	--	1.24E+05	--	2.97E+05
Beryllium	**	**	7.22E-01	8.87E+03	4.42E+02	--
Cadmium	**	**	--	1.77E+03	5.89E+02	--
Calcium	**	**	--	--	--	--
Chromium	**	**	--	8.87E+03	8.83E+01	1.27E+03
Cobalt	**	**	--	1.77E+01	--	6.06E+05
Copper	**	**	--	6.56E+04	--	NA
Iron	**	**	--	--	--	NA
Lead	**	**	--	--	--	--
Magnesium	**	**	--	--	--	
Manganese	**	**	--	1.77E+05	--	2.12E+05
Mercury	**	**	--	5.32E+02	--	1.91E+05
Nickel	**	**	--	3.55E+04	2.18E+03	--
Potassium	**	**	--	--	--	--
Selenium	**	**	--	8.87E+03	--	--
Silver	**	**	--	8.87E+03	--	--
Sodium	**	**	--	--	--	--
Thallium	**	**	--	1.42E+02	--	--
Vanadium	**	**	--	1.24E+04	--	--
Zinc	**	**	--	3.55E+05	--	--
Cyanide	**	**	--	3.55E+04	--	--
135TNB	--	1.94E+01	--	8.87E+01	--	--
13DNB	--	3.87E+01	--	1.77E+02	--	--
246TNT	2.26E+01	1.94E+02	1.04E+02	8.87E+02	--	--
24DNT	9.96E-01	7.74E+02	4.57E+00	3.55E+03	--	--
26DNT	9.96E-01	3.87E+02	4.57E+00	1.77E+03	--	--
HMX	--	1.94E+04	--	8.87E+04	--	--
NB	--	1.94E+02	--	8.87E+02	--	NA
RDX	(a)	(a)	2.82E+01	5.32E+03	--	--
Tetryl	--	3.87E+03	--	1.77E+04	--	--
Nitrite/Nitrate	**	**	--	NA	--	--
Tetrachloroethylene	**	**	6.09E+01	1.77E+04	NA	--
(b) 1,1,1-Trichloroethane	**	**	--	1.60E+05	--	NA
Trichloroethylene	**	**	2.82E+02	--	6.18E+05	--
Xylenes	**	**	--	NA	--	NA
Anthracene	<>	<>	--	5.32E+05	--	--
Benzo(a)anthracene	<>	<>	5.35E-01	--	6.08E+02	--
(b) Benzo(a)pyrene	<>	<>	5.35E-01	--	6.08E+02	--
Benzo(b)fluoranthene	<>	<>	5.35E-01	--	6.08E+02	--
(b) Benzo(ghi)perylene	<>	<>	--	--	--	--
Benzo(k)fluoranthene	<>	<>	5.35E-01	--	6.08E+02	--
Bis(2-ethylhexyl) phthalate	<>	<>	2.22E+02	3.55E+04	--	--
Chrysene	<>	<>	5.35E-01	--	6.08E+02	--
Dibenzofuran	<>	<>	--	--	--	--
Di-n-butyl phthalate	<>	<>	--	1.77E+05	--	--
Fluoranthene	<>	<>	--	7.10E+04	--	--
(b) Indeno(1,2,3-cd)pyrene	<>	<>	5.35E-01	--	6.08E+02	--
2-Methylnaphthalene	<>	<>	--	--	--	--
Naphthalene	<>	<>	--	7.10E+03	--	--
N-nitrosodiphenylamine	<>	<>	6.34E+02	--	--	--
Phenanthrene	<>	<>	--	--	--	--
Pyrene	<>	<>	--	5.32E+04	--	--
Chlordane	<>	<>	2.39E+00	1.06E+02	2.85E+03	--
Dieldrin	<>	<>	1.94E-01	8.87E+01	2.32E+02	--
DDD	<>	<>	1.29E+01	--	--	--
DDE	<>	<>	9.13E+00	--	--	--
DDT	<>	<>	9.13E+00	8.87E+02	1.09E+04	--
Endrin	<>	<>	--	5.32E+02	--	--
PCB-1260	6.56E-01	--	4.03E-01	--	--	--

TABLE 8-36* (cont'd)

Summary of Preliminary Remediation Goals (PRGs) and Combined PRGs for Soil Due to Potential Exposure by Pathways 1, 2, and 3 Agricultural Land Use Scenario

	Combined PRGs (mg/kg)			
	Carcinogenic			Noncarcinogenic
Analytes	Risk=1E-06	Risk=1E-05	Risk=1E-04	HI=1
Aluminum	–	–	–	NA
Antimony	–	–	–	7.10E+02
Arsenic	1.76E+00	1.76E+01	1.76E+02	5.32E+02
Barium	–	–	–	8.76E+04
Beryllium	7.21E-01	7.21E+00	7.21E+01	8.87E+03
Cadmium	5.89E+02	5.89E+03	5.89E+04	1.77E+03
Calcium	–	–	–	–
Chromium	8.83E+01	8.83E+02	8.83E+03	1.11E+03
Cobalt	–	–	–	1.77E+01
Copper	–	–	–	6.56E+04
Iron	–	–	–	NA
Lead	–	–	–	–
Magnesium	–	–	–	–
Manganese	–	–	–	9.66E+04
Mercury	–	–	–	5.31E+02
Nickel	2.18E+03	2.18E+04	2.18E+05	3.55E+04
Potassium	–	–	–	–
Selenium	–	–	–	8.87E+03
Silver	–	–	–	8.87E+03
Sodium	–	–	–	–
Thallium	–	–	–	1.42E+02
Vanadium	–	–	–	1.24E+04
Zinc	–	–	–	3.55E+05
Cyanide	–	–	–	3.55E+04
135TNB	–	–	–	1.59E+01
13DNB	–	–	–	3.18E+01
246TNT	1.85E+01	1.85E+02	1.85E+03	1.59E+02
24DNT	8.18E-01	8.18E+00	8.18E+01	6.35E+02
26DNT	8.18E-01	8.18E+00	8.18E+01	3.18E+02
HMX	–	–	–	1.59E+04
NB	–	–	–	1.59E+02
RDX	2.82E+01	2.82E+02	2.82E+03	5.32E+03
Tetryl	–	–	–	3.18E+03
Nitrite/Nitrate	–	–	–	NA
Tetrachloroethylene	6.09E+01	6.09E+02	6.09E+03	1.77E+04
(b) 1,1,1-Trichloroethane	–	–	–	1.60E+05
Trichloroethylene	2.82E+02	2.82E+03	2.82E+04	–
Xylenes	–	–	–	NA
Anthracene	–	–	–	5.32E+05
Benzo(a)anthracene	5.35E-01	5.35E+00	5.35E+01	–
(b) Benzo(a)pyrene	5.35E-01	5.35E+00	5.35E+01	–
Benzo(b)fluoranthene	5.35E-01	5.35E+00	5.35E+01	–
(b) Benzo(ghi)perylene	–	–	–	–
Benzo(k)fluoranthene	5.35E-01	5.35E+00	5.35E+01	–
Bis(2-ethylhexyl) phthalate	2.22E+02	2.22E+03	2.22E+04	3.55E+04
Chrysene	5.35E-01	5.35E+00	5.35E+01	–
Dibenzofuran	–	–	–	–
Di-n-butyl phthalate	–	–	–	1.77E+05
Fluoranthene	–	–	–	7.10E+04
(b) Indeno(1,2,3-cd)pyrene	5.35E-01	5.35E+00	5.35E+01	–
2-Methylnaphthalene	–	–	–	–
Naphthalene	–	–	–	7.10E+03
N-nitrosodiphenylamine	6.34E+02	6.34E+03	6.34E+04	–
Phenanthrene	–	–	–	–
Pyrene	–	–	–	5.32E+04
Chlordane	2.39E+00	2.39E+01	2.39E+02	1.06E+02
Dieldrin	1.94E-01	1.94E+00	1.94E+01	8.87E+01
DDD	1.29E+01	1.29E+02	1.29E+03	–
DDE	9.13E+00	9.13E+01	9.13E+02	–
DDT	9.12E+00	9.12E+01	9.12E+02	8.87E+02
Endrin	–	–	–	5.32E+02
PCB-1260	2.50E-01	2.50E+00	2.50E+01	–

"–" - Indicates that the relevant health effects criteria are unavailable.
"***" - Not calculated because dermal absorption of inorganic and volatile organic contaminants is assumed to be negligible (USEPA, 1991c; USEPA, 1992a).
"<>" - Not calculated because dermal absorption data are not available.
(a) - PRGs are not determined for RDX for this exposure pathway because of insufficient evidence of dermal absorption in humans.
(b) - New contaminant of concern with the addition of followup fieldwork results.
HI - Hazard Index
NA - Not applicable because the calculated PRG is greater than one million parts per million (mg/kg).
* - Replaces original Table 8-36 in the Final Baseline RA; Dames & Moore, 1992a.

TABLE 8-38*

Summary of Preliminary Remediation Goals (PRGs) for Soil Recreational Land Use Scenario

Recreational Land Use (Hunting)
Pathway 10 Soil PRGs (mg/kg)
Consumption of Game

Analyte (a)	Carcinogenic Risk = 1.0E-06	Carcinogenic Risk = 1.0E-05	Carcinogenic Risk = 1.0E-04	Noncarcinogenic Hazard Index = 1.0
Arsenic	2.42E+03	2.42E+04	2.42E+05	5.44E+05
Beryllium	7.87E+03	7.87E+04	7.87E+05	NA
Cadmium	–	–	–	6.91E+05
Chromium	–	–	–	NA
Lead	–	–	–	–
Mercury	–	–	–	1.79E+03
Nickel	–	–	–	NA
135TNB	–	–	–	1.69E+03
13DNB	–	–	–	3.56E+03
246TNT	3.05E+03	3.05E+04	3.05E+05	1.96E+04
24DNT	1.31E+02	1.31E+03	1.31E+04	7.62E+04
26DNT	1.32E+02	1.32E+03	1.32E+04	3.84E+04
HMX	–	–	–	NA
NB	–	–	–	1.91E+04
RDX	6.73E+02	6.73E+03	6.73E+04	9.52E+04
Tetryl	–	–	–	3.68E+05
Tetrachloroethylene	2.19E+03	2.19E+04	2.19E+05	4.80E+05
(b) 1,1,1-Trichloroethane	–	–	–	NA
Trichloroethylene	8.74E+03	8.74E+04	8.74E+05	–
Xylenes	–	–	–	NA
Anthracene	–	–	–	NA
Benzo(a)anthracene	3.01E+01	3.01E+02	3.01E+03	–
(b) Benzo(a)pyrene	3.26E+01	3.26E+02	3.26E+03	–
Benzo(b)fluoranthene	3.25E+01	3.25E+02	3.25E+03	–
(b) Benzo(ghi)perylene	–	–	–	–
Benzo(k)fluoranthene	3.75E+01	3.75E+02	3.75E+03	–
Bis(2-ethylhexyl) phthalate	1.10E+04	1.10E+05	NA	NA
Chrysene	3.01E+01	3.01E+02	3.01E+03	–
Dibenzofuran	–	–	–	–
Di-n-butyl phthalate	–	–	–	NA
Fluoranthene	–	–	–	NA
(b) Indeno(1,2,3-cd)pyrene	3.22E+01	3.22E+02	3.22E+03	–
2-Methylnaphthalene	–	–	–	–
Naphthalene	–	–	–	NA
N-nitrosodiphenylamine	2.29E+04	2.29E+05	NA	–
Phenanthrene	–	–	–	–
Pyrene	–	–	–	NA
Chlordane	1.33E+02	1.33E+03	1.33E+04	4.43E+03
Dieldrin	8.79E+00	8.79E+01	8.79E+02	3.01E+03
DDD	7.22E+02	7.22E+03	7.22E+04	–
DDE	5.23E+02	5.23E+03	5.23E+04	–
DDT	5.89E+02	5.89E+03	5.89E+04	4.29E+04
Endrin	–	–	–	2.14E+04
PCB-1260	2.47E+01	2.47E+02	2.47E+03	–

'–' - Indicates that the relevant health effects criteria are unavailable.
NA - Not applicable because the calculated PRG is greater than one million parts per million (mg/kg).
(a) - PRGs are only calculated for the inorganic analytes for which fate and transport data (e.g., uptake factors and transfer coefficients) exist.
(b) - New contaminant of concern with the addition of followup fieldwork results.
* - Replaces original Table 8-38 in the Final Baseline RA; Dames & Moore, 1992a.

TABLE 8-39*

Summary of Preliminary Remediation Goals (PRGs) and Combined PRGs for Soil Due to Potential Exposure by Pathways 1, 2, 3, 10, 11, and 12 Assuming Land Use Scenario of Residents that Hunt

	Pathway 1 PRGs (mg/kg) Dermal Absorption		Pathway 2 PRGs (mg/kg) Soil Ingestion		Pathway 3 PRGs (mg/kg) Dust Inhalation	
Analytes	Carcinogenic Risk=1E-06	Noncarcinogenic HI=1	Carcinogenic Risk=1E-06	Noncarcinogenic HI=1	Carcinogenic Risk=1E-06	Noncarcinogenic HI=1
Aluminum	**	**	–	7.94E+05	–	–
Antimony	**	**	–	1.10E+02	–	–
Arsenic	**	**	3.65E-01	8.21E+01	5.71E+01	–
Barium	**	**	–	1.92E+04	–	4.79E+04
Beryllium	**	**	1.49E-01	1.37E+03	9.51E+01	–
Cadmium	**	**	–	2.74E+02	1.27E+02	–
Calcium	**	**	–	–	–	–
Chromium	**	**	–	1.37E+03	1.90E+01	2.05E+02
Cobalt	**	**	–	2.74E+00	–	9.79E+04
Copper	**	**	–	1.01E+04	–	NA
Iron	**	**	–	–	–	NA
Lead	**	**	–	–	–	–
Magnesium	**	**	–	–	–	–
Manganese	**	**	–	2.74E+04	–	3.42E+04
Mercury	**	**	–	8.21E+01	–	3.08E+04
Nickel	**	**	–	5.48E+03	4.70E+02	–
Potassium	**	**	–	–	–	–
Selenium	**	**	–	1.37E+03	–	–
Silver	**	**	–	1.37E+03	–	–
Sodium	**	**	–	–	–	–
Thallium	**	**	–	2.19E+01	–	–
Vanadium	**	**	–	1.92E+03	–	–
Zinc	**	**	–	5.48E+04	–	–
Cyanide	**	**	–	5.48E+03	–	–
135TNB	–	1.14E+00	–	1.37E+01	–	–
13DNB	–	2.28E+00	–	2.74E+01	–	–
246TNT	1.77E+00	1.14E+01	2.13E+01	1.37E+02	–	–
24DNT	7.83E-02	4.56E+01	9.39E-01	5.48E+02	–	–
26DNT	7.83E-02	2.28E+01	9.39E-01	2.74E+02	–	–
HMX	–	1.14E+03	–	1.37E+04	–	–
NB	–	1.14E+01	–	1.37E+02	–	2.05E+05
RDX	(a)	(a)	5.81E+00	8.21E+02	–	–
Tetryl	–	2.28E+02	–	2.74E+03	–	–
Nitrite/Nitrate	**	**	–	4.38E+05	–	–
Tetrachloroethylene	**	**	1.25E+01	2.74E+03	4.44E+05	–
(b) **1,1,1-Trichloroethane**	**	**	–	2.46E+04	–	NA
Trichloroethylene	**	**	5.81E+01	–	1.33E+05	–
Xylenes	**	**	–	5.48E+05	–	NA
Anthracene	<>	<>	–	8.21E+04	–	–
Benzo(a)anthracene	<>	<>	1.10E-01	–	1.31E+02	–
(b) **Benzo(a)pyrene**	<>	<>	1.10E-01	–	1.31E+02	–
Benzo(b)fluoranthene	<>	<>	1.10E-01	–	1.31E+02	–
(b) **Benzo(ghi)perylene**	<>	<>	–	–	–	–
Benzo(k)fluoranthene	<>	<>	1.10E-01	–	1.31E+02	–
Bis(2-ethylhexyl) phthalate	<>	<>	4.56E+01	5.48E+03	–	–
Chrysene	<>	<>	1.10E-01	–	1.31E+02	–
Dibenzofuran	<>	<>	–	–	–	–
Di-n-butyl phthalate	<>	<>	–	2.74E+04	–	–
Fluoranthene	<>	<>	–	1.10E+04	–	–
(b) **Indeno(1,2,3-cd)pyrene**	<>	<>	1.10E-01	–	1.31E+02	–
2-Methylnaphthalene	<>	<>	–	–	–	–
Naphthalene	<>	<>	–	1.10E+03	–	–
N-nitrosodiphenylamine	<>	<>	1.30E+02	–	–	–
Phenanthrene	<>	<>	–	–	–	–
Pyrene	<>	<>	–	8.21E+03	–	–
Chlordane	<>	<>	4.91E-01	1.64E+01	6.15E+02	–
Dieldrin	<>	<>	3.99E-02	1.37E+01	4.99E+01	–
DDD	<>	<>	2.66E+00	–	–	–
DDE	<>	<>	1.88E+00	–	–	–
DDT	<>	<>	1.88E+00	1.37E+02	2.35E+03	–
Endrin	<>	<>	–	8.21E+01	–	–
PCB-1260	5.16E-02	–	8.30E-02	–	–	–

TABLE 8-39* (cont'd)

Summary of Preliminary Remediation Goals (PRGs) and Combined PRGs for Soil Due to Potential Exposure by Pathways 1, 2, 3, 10, 11, and 12 Assuming Land Use Scenario of Residents that Hunt

	Pathway 10 PRGs (mg/kg) Consumption of Game		Pathway 11 PRGs (mg/kg) Beef and Milk Consumption		Pathway 12 PRGs (mg/kg) Consumption of Crops	
Analytes	Carcinogen Risk=1E-06	Noncarcinogenic HI=1	Carcinogenic Risk=1E-06	Noncarcinogenic HI=1	Carcinogenic Risk=1E-06	Noncarcinogenic HI=1
Aluminum	XX	XX	XX	XX	XX	XX
Antimony	XX	XX	XX	XX	XX	XX
Arsenic	2.42E+03	5.44E+05	4.09E+01	1.24E+04	2.74E-01	6.16E+01
Barium	XX	XX	XX	XX	XX	XX
Beryllium	7.87E+03	NA	2.08E+02	NA	4.46E-01	4.11E+03
Cadmium	–	6.91E+05	–	1.26E+03	–	1.37E+01
Calcium	XX	XX	XX	XX	XX	XX
Chromium	–	NA	–	2.45E+05	–	4.11E+03
Cobalt	XX	XX	XX	XX	XX	XX
Copper	XX	XX	XX	XX	XX	XX
Iron	XX	XX	XX	XX	XX	XX
Lead	–	–	–	–	–	–
Magnesium	XX	XX	XX	XX	XX	XX
Manganese	XX	XX	XX	XX	XX	XX
Mercury	–	1.79E+03	–	4.91E+01	–	2.74E+00
Nickel	–	NA	–	1.97E+05	–	3.29E+02
Potassium	XX	XX	XX	XX	XX	XX
Selenium	XX	XX	XX	XX	XX	XX
Silver	XX	XX	XX	XX	XX	XX
Sodium	XX	XX	XX	XX	XX	XX
Thallium	XX	XX	XX	XX	XX	XX
Vanadium	XX	XX	XX	XX	XX	XX
Zinc	XX	XX	XX	XX	XX	XX
Cyanide	XX	XX	XX	XX	XX	XX
135TNB	–	1.69E+03	–	2.48E+01	–	5.08E-03
13DNB	–	3.56E+03	–	5.21E+01	–	1.54E-02
246TNT	3.05E+03	1.96E+04	4.46E+01	2.87E+02	2.37E-02	1.52E-01
24DNT	1.31E+02	7.62E+04	1.91E+00	1.11E+03	1.01E-03	5.91E-01
26DNT	1.32E+02	3.84E+04	1.92E+00	5.61E+02	9.00E-04	2.62E-01
HMX	–	NA	–	2.10E+04	–	1.50E+00
NB	–	1.91E+04	–	2.79E+02	–	1.24E-01
RDX	6.73E+02	9.52E+04	9.84E+00	1.39E+03	1.38E-03	1.96E-01
Tetryl	–	3.68E+05	–	5.38E+03	–	1.91E+00
Nitrite/Nitrate	XX	XX	XX	XX	XX	XX
Tetrachloroethylene	2.19E+03	4.80E+05	3.21E+01	7.01E+03	6.34E-02	1.38E+01
(b) 1,1,1-Trichloroethane	–	NA	–	**5.63E+04**	–	**5.25E+01**
Trichloroethylene	8.74E+03	–	1.28E+02	–	9.47E-02	–
Xylenes	–	NA	–	NA	–	2.84E+03
Anthracene	–	NA	–	2.66E+05	–	2.37E+03
Benzo(a)anthracene	3.01E+01	–	4.39E-01	–	1.49E-02	–
(b) Benzo(a)pyrene	**3.26E+01**	–	**4.76E-01**	–	**2.64E-02**	–
Benzo(b)fluoranthene	3.25E+01	–	4.75E-01	–	2.64E-02	–
(b) Benzo(ghi)perylene	–	–	–	–	–	–
Benzo(k)fluoranthene	3.75E+01	–	5.49E-01	–	7.56E-02	–
Bis(2-ethylhexyl) phthalate	1.10E+04	NA	1.60E+02	1.92E+04	2.34E+00	2.81E+02
Chrysene	3.01E+01	–	4.39E-01	–	1.49E-02	–
Dibenzofuran	–	–	–	–	–	–
Di-n-butyl phthalate	–	NA	–	1.10E+05	–	3.67E+03
Fluoranthene	–	NA	–	4.17E+04	–	1.02E+03
(b) Indeno(1,2,3-cd)pyrene	**3.22E+01**	–	**4.70E-01**	–	**2.41E-02**	–
2-Methylnaphthalene	–	–	–	–	–	–
Naphthalene	–	NA	–	2.93E+04	–	7.52E+00
N-nitrosodiphenylamine	2.29E+04	–	3.35E+02	–	6.51E-01	–
Phenanthrene	–	–	–	–	–	–
Pyrene	–	NA	–	2.89E+04	–	4.34E+02
Chlordane	1.33E+02	4.43E+03	1.94E+00	6.48E+01	6.07E-02	2.03E+00
Dieldrin	8.79E+00	3.01E+03	1.28E-01	4.40E+01	1.08E-03	3.70E-01
DDD	7.22E+02	–	1.06E+01	–	3.37E-01	–
DDE	5.23E+02	–	7.64E+00	–	2.83E-01	–
DDT	5.89E+02	4.29E+04	8.61E+00	6.27E+02	6.90E-01	5.03E+01
Endrin	–	2.14E+04	–	3.13E+02	–	7.75E+00
PCB-1260	2.47E+01	–	3.60E-02	–	2.09E-02	–

TABLE 8-39* (cont'd)

Summary of Preliminary Remediation Goals (PRGs) and Combined PRGs for Soil Due to Potential Exposure by Pathways 1, 2, 3, 10, 11, and 12 Assuming Land Use Scenario of Residents that Hunt

	Combined PRGs (mg/kg)			
	Carcinogenic			Noncarcinogenic
Analytes	Risk=1E-06	Risk=1E-05	Risk=1E-04	HI=1
Aluminum	–	–	–	7.94E+05
Antimony	–	–	–	1.10E+02
Arsenic	1.55E-01	1.55E+00	1.55E+01	3.51E+01
Barium	–	–	–	1.37E+04
Beryllium	1.11E-01	1.11E+00	1.11E+01	1.03E+03
Cadmium	1.27E+02	1.27E+03	1.27E+04	1.29E+01
Calcium	–	–	–	–
Chromium	1.90E+01	1.90E+02	1.90E+03	1.71E+02
Cobalt	–	–	–	2.74E+00
Copper	–	–	–	1.01E+04
Iron	–	–	–	NA
Lead	–	–	–	–
Magnesium	–	–	–	–
Manganese	–	–	–	1.52E+04
Mercury	–	–	–	2.51E+00
Nickel	4.70E+02	4.70E+03	4.70E+04	3.09E+02
Potassium	–	–	–	–
Selenium	–	–	–	1.37E+03
Silver	–	–	–	1.37E+03
Sodium	–	–	–	–
Thallium	–	–	–	2.19E+01
Vanadium	–	–	–	1.92E+03
Zinc	–	–	–	5.48E+04
Cyanide	–	–	–	5.48E+03
135TNB	–	–	–	5.05E-03
13DNB	–	–	–	1.53E-02
246TNT	2.33E-02	2.33E-01	2.33E+00	1.50E-01
24DNT	9.99E-04	9.99E-03	9.99E-02	5.83E-01
26DNT	8.89E-04	8.89E-03	8.89E-02	2.59E-01
HMX	–	–	–	1.50E+00
NB	–	–	–	1.23E-01
RDX	1.38E-03	1.38E-02	1.38E-01	1.95E-01
Tetryl	–	–	–	1.89E+00
Nitrite/Nitrate	–	–	–	4.38E+05
Tetrachloroethylene	6.29E-02	6.29E-01	6.29E+00	1.38E+01
(b) 1,1,1-Trichloroethane	–	–	–	5.23E+01
Trichloroethylene	9.45E-02	9.45E-01	9.45E+00	–
Xylenes	–	–	–	2.82E+03
Anthracene	–	–	–	2.28E+03
Benzo(a)anthracene	1.27E-02	1.27E-01	1.27E+00	–
(b) Benzo(a)pyrene	2.04E-02	2.04E-01	2.04E+00	–
Benzo(b)fluoranthene	2.04E-02	2.04E-01	2.04E+00	–
(b) Benzo(ghi)perylene	–	–	–	–
Benzo(k)fluoranthene	4.14E-02	4.14E-01	4.14E+00	–
Bis(2-ethylhexyl) phthalate	2.19E+00	2.19E+01	2.19E+02	2.63E+02
Chrysene	1.27E-02	1.27E-01	1.27E+00	–
Dibenzofuran	–	–	–	–
Di-n-butyl phthalate	–	–	–	3.14E+03
Fluoranthene	–	–	–	9.13E+02
(b) Indeno(1,2,3-cd)pyrene	1.90E-02	1.90E-01	1.90E+00	–
2-Methylnaphthalene	–	–	–	–
Naphthalene	–	–	–	7.47E+00
N-nitrosodiphenylamine	6.46E-01	6.46E+00	6.46E+01	–
Phenanthrene	–	–	–	–
Pyrene	–	–	–	4.06E+02
Chlordane	5.25E-02	5.25E-01	5.25E+00	1.76E+00
Dieldrin	1.04E-03	1.04E-02	1.04E-01	3.57E-01
DDD	2.91E-01	2.91E+00	2.91E+01	–
DDE	2.38E-01	2.38E+00	2.38E+01	–
DDT	4.76E-01	4.76E+00	4.76E+01	3.47E+01
Endrin	–	–	–	6.92E+00
PCB-1260	9.34E-03	9.34E-02	9.34E-01	–

"–" Indicates that the relevant health effects criteria are unavailable.
"**" - Not calculated because dermal absorption of inorganic and volatile organic contaminants is assumed to be negligible (USEPA, 1991c; USEPA, 1992a).
"XX" - Not calculated because quantitative information on uptake factors is not available.
"<>" - Not calculated because dermal absorption data are not available.
(a) - PRGs are not determined for RDX for this exposure pathway because of insufficient evidence of dermal absorption in humans.
(b) - New contaminant of concern with the addition of followup fieldwork results.
HI - Hazard Index
NA - Not applicable because the calculated PRG is greater than one million parts per million (mg/kg).

9.0* SUMMARY AND CONCLUSIONS

The summary and conclusions related to data evaluation and the identification of contaminants of concern are presented in Section 9.1 of the Baseline RA and are not repeated in this addendum. Followup fieldwork results did not alter the contaminants of concern for groundwater. Additional contaminants of concern were identified in surface and subsurface soil at certain sites based on followup fieldwork results.

Although Tables 9-2* and 9-3* summarize the multipathway risk and hazard estimates for current and future receptors, respectively, at all of the UMDA sites evaluated in the Baseline RA and this addendum, only the 16 followup fieldwork sites are included in the discussions below. (Tables 9-2*, 9-3*, and 9-4* are placed at the end of Section 9.0*).

9.2* EXPOSURE ASSESSMENT

The principal exposure pathways through which humans might be exposed to site contaminants under current land use conditions are presented in Table 9-2*.

Of the possible future land uses for UMDA property (i.e., residential, light industrial, military, construction, agricultural, and recreational), residential land use generally yields the highest exposures because of the long exposure frequency and duration for this population. Therefore, the residential scenario is assumed to be the most conservative future scenario and the most appropriate scenario to consider when estimating risks or hazards. Principal exposure pathways considered to be complete and selected for quantification at one or more followup fieldwork sites under future residential land use conditions are the following:

- Pathway 1--Dermal absorption of contaminants in soil: Followup fieldwork Sites 5, 15, 17, 19, and 47.

- Pathway 2--Inadvertent ingestion of contaminated soil: Followup fieldwork Sites 2, 5, 12, 15, 17, 18, 19, 22, 26, 30, 36, 44 Location II, 47, and 48.

- Pathway 3--Inhalation of contaminated soil as airborne dust: Followup fieldwork Sites 2, 5, 12, 15, 17, 18, 19, 22, 26, 30, 36, 44 Location II, 47, and 48.

- Pathway 5--Ingestion of contaminated drinking water: Followup fieldwork Sites 11, 12, 15, 18, 19, 47, and 50.

- Pathway 6--Inhalation of VOCs emitted from groundwater during showering: Followup fieldwork Site 47.

- Pathway 7--Dermal absorption of contaminants in groundwater during showering: Followup fieldwork Sites 11, 12, 19, 47, and 50.

- Pathway 12--Consumption of crops irrigated by contaminated groundwater or grown in contaminated soil: Followup fieldwork Sites 2, 5, 11, 12, 15, 17, 18, 19, 22, 26, 30, 36, 44 Location II, 47, 48, and 50.

These seven pathways are incomplete at the followup fieldwork sites not listed above. (See Section 6.2.2.1* for an explanation of why certain pathways are not complete for selected sites.) The future military use of Operable Unit B sites by the Oregon National Guard (for tank training exercises) is quantitatively evaluated. Only pathway 3 (inhalation of contaminated soil as airborne dust)--at followup fieldwork Sites 15, 17, 18, and 19--is considered complete for this future land use scenario.

9.3 HUMAN HEALTH RISK EVALUATION

9.3.1* Current Land Use Conditions

A summary of estimated risks and hazards under current land use conditions is presented in Table 9-2* for the 11 receptor populations quantitatively evaluated in the Baseline RA and in this addendum. As in the Baseline RA, the risks and hazards for all currently exposed populations via all pathways quantitatively evaluated are

below 1E-06 and 1, respectively. As in the Baseline RA, the receptors whose potential exposure yields the highest risk and hazard are the OD pit/open burning tray workers, whose multiple pathway risk and hazard are 4E-07 and 2E-01, respectively. These results are slightly lower than or equal to those calculated in the Baseline RA (8E-07 and 2E-01, respectively (Dames & Moore, 1992a)).

9.3.2* <u>Future Land Use Conditions</u>

A summary of the estimated risks and hazards under future land use conditions is presented in Table 9-3* for future residents, military personnel, industrial personnel, farmers, hunters, and construction workers.

It should be noted that--though residential development of the ADA Area was quantitatively evaluated--such development is unlikely given the high probability that UXO exists throughout the area. Unrestricted future land use scenarios (i.e., residential, agricultural, recreational, and light industrial) in the ADA Area--which result in some of the highest risks and hazards calculated in the Baseline RA and in this addendum--are not likely to occur unless the area is fully remediated and UXO is removed. The estimated risks and hazards at ADA Area followup fieldwork Sites 15, 17, 18, and 19 may be unreasonably high, because it is not likely that the unrestricted land uses will become operable.

9.3.2.1* <u>Future Residential Land Use Conditions</u>. The following conclusions were drawn from the evaluation of risks and hazards under the future residential land use scenario, which is assumed to be more conservative than the other five future land use scenarios (i.e., light industrial, military, construction, agricultural, and recreational). These conclusions, while not exhaustive, are intended to aid readers in sorting through the many risks and hazards calculated for this scenario.

(1) At four of the 16 followup fieldwork sites--Sites 2, 26, 30, and 44 Location II--one of the following two conditions applies. Either multipathway carcinogenic risks under all future land use scenarios evaluated are below the NCP risk range of 1E-04 to 1E-06, and multipathway noncarcinogenic hazards are less than 1; or no

carcinogenic risks are calculated because appropriate slope factors are not available for any of the contaminants of concern, and multipathway noncarcinogenic hazards are less than 1.

Sites 2 and 44 Location II were not previously sampled; therefore, no results were presented for these sites in the Baseline RA. Conclusions for Sites 26 and 30 based on followup fieldwork results are similar to those presented for these sites in the Baseline RA (Dames & Moore, 1992a).

(2) At one of the remaining 12 followup fieldwork sites--Site 36--the multipathway potential carcinogenic risk is below the risk range of 1E-04 to 1E-06, and the multipathway noncarcinogenic hazard exceeds 1. These conclusions are the same as those presented for Site 36 in the Baseline RA (Dames & Moore, 1992a).

(3) At one of the remaining 11 followup fieldwork sites--Site 22--the multipathway potential carcinogenic risk is greater than 1E-06, but less than 1E-05, and the multipathway noncarcinogenic hazard exceeds 1. The carcinogenic risk result (9E-06) is slightly greater than that calculated in the Baseline RA (1E-06), while the noncarcinogenic result (2) is slightly lower than that (3) calculated in the Baseline RA (Dames & Moore, 1992a).

(4) At two of the remaining 10 followup fieldwork sites--Sites 48 and 50--multipathway potential carcinogenic risks are greater than 1E-05 but less than or equal to 1E-04, and multipathway noncarcinogenic hazards are less than 1. These conclusions are the same as those presented for Sites 48 and 50 in the Baseline RA (Dames & Moore, 1992a).

(5) At the remaining eight followup fieldwork sites--Sites 5, 11, 12, 15, 17, 18, 19, and 47--multipathway potential carcinogenic risks are equal to or exceed 1E-04, and multipathway noncarcinogenic hazards are equal to

or exceed 1. These conclusions are similar to those presented for these sites in the Baseline RA (Dames & Moore, 1992a).

9.3.2.1.1* Discussion of Conclusions for Carcinogenic Risk Estimates. As in the Baseline RA, of the 11 followup fieldwork sites with multipathway carcinogenic risk estimates within the NCP risk range of 1E-04 to 1E-06 or exceeding the upper bound of this range (see conclusions (3), (4), and (5) above), pathway 5 (ingestion of contaminated drinking water) is the only pathway that significantly contributes to the multipathway risk at five of the followup fieldwork sites--Sites 11, 12, 18, 47 (flood gravel and basalt aquifers), and 50. As in the Baseline RA, arsenic is a dominant contaminant of concern for pathway 5 at these sites. For example, if this contaminant and pathway are not considered, multipathway carcinogenic risks at the five sites decrease by 1 to 2 orders of magnitude, though most are still within the NCP risk range of 1E-04 to 1E-06.

Although only a few (e.g., two to 10) groundwater samples were collected at the five sites listed above, arsenic was detected in almost every sample. Detected concentrations of arsenic generally range from 5 to 40 μg/L, which exceeds the maximum background groundwater arsenic concentration of 1 μg/L. It should be noted, however, that all detected groundwater concentrations of arsenic are less than its MCL of 50 μg/L.

Although oral carcinogenicity data for arsenic are based on epidemiology studies with over 40,000 participants, some disagreement continues among EPA regulators, and new data are evaluated as they become available (USEPA, 1992c). The results of epidemiological studies in Taiwan, Chile, Argentina, and Mexico indicate an increased skin cancer prevalence associated with arsenic exposure (USEPA, 1992c). The exposed Taiwanese population also had elevated standard mortality ratios attributable to cancers of the bladder, lung, liver, kidney, skin, and colon. Based on increased skin cancer incidence in orally exposed individuals, EPA classifies arsenic in weight-of-evidence Group A (human carcinogen; USEPA, 1992a). Possible confounding factors in the Taiwanese study include the role of other drinking

water contaminants, dietary factors, and experimenter scoring bias (USEPA, 1988c). Furthermore, the extrapolation model used to estimate low dose risks may have been overly conservative because of the possibility of low dose detoxification activity (Marcus and Rispin, 1988). Nevertheless, a lack of knowledge about the exact shape of the extrapolated dose-response curve does not nullify the extensive weight of evidence associating arsenic exposure with skin cancer induction (USPHS, 1990).

At four of the remaining six followup fieldwork sites with multipathway carcinogenic risks within the NCP risk range of 1E-04 to 1E-06 or exceeding the upper bound of this range--Sites 5, 15, 17, and 19--pathway 12 (crop ingestion) is the only significant pathway for carcinogenic risks. These results are similar to those presented in the Baseline RA (Dames & Moore, 1992a). If crop ingestion is not considered at these sites, risks decrease by 1 to 2 orders of magnitude, but in most cases are still within the NCP risk range of 1E-04 to 1E-06. As noted in Section 7.0*, certain future residents may not grow and ingest their own crops; therefore, this pathway may not be applicable to them. Management decisions based on results of the crop ingestion pathway should be withheld until further data become available to document the legitimacy of this pathway at UMDA (e.g., "pilot" crop growing, whereby crops are grown in contaminated soil, irrigated with contaminated groundwater, and then sampled and analyzed). It is primarily concentrations of RDX and TNT in surface soil that contributed to the risks estimated for pathway 12 at these sites. Concentrations of RDX in surface soil range from 0.4 to 1,600 μg/g, while concentrations of 2,4,6-TNT range from 0.8 to 43,000 μg/g.

2,4,6-TNT is classified as an EPA Group C carcinogen (USEPA, 1992c), based on the combined tumor incidence in rats and mice exposed to dietary 2,4,6-TNT for 2 years (Furedi et al., 1984a; 1984b). Female rats exposed to 50 mg/kg/day of 2,4,6-TNT have an increased incidence of combined transitional cell papillomas and carcinoma of the urinary bladder. Urinary tract hyperplasia in both sexes supports the finding of renal carcinogenicity. Exposed female mice show an increased incidence of malignant lymphoma and leukemia of the spleen, compared with untreated controls. For mice, the total incidence of hematopoietic tumors in all organs is not significantly

treatment-related. According to National Technology Program Guidelines (McConnell et al., 1986), only the total incidence of hematopoietic tumors, rather than the incidence in any single organ, should be considered in the weight-of-evidence classification. Because verified tumorigenicity is observed in only one species, the Group C classification is justified (USEPA, 1986a).

RDX is carcinogenic in one of three rodent bioassays (Lish et al., 1984). However, technical flaws in this study involve reduction in the highest dietary level given to female mice because of excessive mortality, sample contamination with 3 to 10 percent HMX, and the lack of statistically significant differences when the incidences of adenomas and carcinomas are analyzed separately (USEPA, 1988d). Tumor incidence in rats is not increased in either of two lifetime bioassays (Levine et al., 1983; Hart, 1977). Based on the mouse tumor incidence and the absence of effects in rats, RDX is considered a Group C carcinogen (possible human carcinogen; USEPA, 1986a; 1991d). Despite technical flaws in the Lish study, the confidence in this weight-of-evidence classification is considered to be high.

Both pathways 2 and 12 significantly contribute to the estimated multipathway risk at Sites 22 and 48, with various contaminants dominating risks via these two pathways. The multipathway risk calculated for Site 22 (9E-06) is greater than that calculated in the Baseline RA (1E-06), primarily due to the detection of beryllium (which was detected only during followup fieldwork). It should be noted that the maximum concentration of beryllium, 1.89 $\mu g/g$, is only slightly greater than both the background comparison criterion of 1.86 $\mu g/g$ and the sample detection limit of 1.86 $\mu g/g$. Also, only one of 30 soil samples at this site exceeded the background comparison criterion.

Beryllium is classified as Group B2 (probable human carcinogen) on the basis of tumor induction in animals administered beryllium salts by inhalation or by intravenous or intramedullary injection (USEPA, 1992c). Analysis of the only available oral study (Schroeder and Mitchener, 1975) does not indicate a statistically significant increase in gross tumors in rats exposed for life to beryllium sulfate in

drinking water. However, EPA uses this study as the basis for an oral slope factor, because the tumor incidence is not significantly increased (USEPA, 1992c). Therefore, the oral slope factor is suspect because of the lack of adequate route-specific data.

9.3.2.1.2* Discussion of Conclusions for Noncarcinogenic Hazard Estimates. As in the Baseline RA, four of the 10 followup fieldwork sites that are listed in conclusions (2), (3), (4), and (5) (Section 9.3.2.1*) as having multipathway noncarcinogenic hazards that exceed 1--Sites 11, 12, 18, and 22--only slightly exceed 1 (i.e., hazards are between 1 and 10). As noted in Section 7.0*, it is appropriate to segregate chemical-specific hazards at some sites (e.g., Sites 11 and 22), because target organ effects or mechanisms of action differ among the contaminants of concern. In some cases, noncarcinogenic hazards are reduced to below 1 if chemical-specific hazards are considered separately. As in the Baseline RA, the six remaining followup fieldwork sites with multipathway noncarcinogenic hazards that exceed 1--Sites 5, 15, 17, 19, 36, and 47--exceed 1 by more than an order of magnitude.

At Sites 11 and 12, pathway 5 (groundwater ingestion) is the only pathway whose hazard index significantly contributes to the multipathway hazard estimates, and arsenic is the dominant contaminant of concern. For example, if this contaminant and pathway are not considered, multipathway noncarcinogenic hazards at these two sites range from 2E-04 to 8E-01, decreasing by 1 to 4 orders of magnitude and falling below 1. As noted in Section 9.3.2.1.1*, arsenic was detected in almost every sample collected. Detected concentrations of arsenic, while exceeding the maximum background groundwater concentration of 1 μg/L, are below arsenic's MCL of 50 μg/L.

Although oral toxicity data for arsenic are based on epidemiology studies with over 40,000 participants, some disagreement continues among EPA regulators, and new data are evaluated as they become available (USEPA, 1992c). The oral reference dose is based on findings of hyperpigmentation, keratosis, and vascular complications in a Chinese population exposed to arsenic in drinking water (Tseng, 1977; Tseng et al., 1968). Although these findings provide the most statistically robust dose-response

relationship between arsenic exposure and toxicity, limitations include the relatively small proportion of older subjects, who are more likely to show symptoms; inadequate knowledge about biological detoxification rates; the possible contributing role of other factors, such as aqueous humic substances, other dietary elements, and the background contribution from drinking water itself; and the possible role of arsenic as an essential nutrient, which--based on experimental evidence--is plausible in goats, rats, and chickens, but has not been adequately demonstrated in humans (USEPA, 1988c; 1992c; USPHS, 1990).

The authors of the ATSDR toxicological profile (USPHS, 1990) state that the NOAEL for chronic inorganic arsenic exposure is between 5E-04 and 1E-02 mg/kg/day, and that the average background rate is approximately 1E-03 mg/kg/day. EPA (1992) calculates a NOAEL of 8E-04 mg/kg/day, and also adds an uncertainty factor of 3 to account for incomplete knowledge about reproductive effects and sensitive populations. Because of the uncertainty associated with possible adverse health effects so close to background intake levels, only medium confidence is placed in the reference dose.

As in the Baseline RA, at Sites 5, 15, and 19, pathway 12 (crop ingestion) is the only pathway whose hazard index significantly contributes to the multipathway hazard estimates. If crop ingestion is not considered at these sites, hazards decrease by 1 to 2 orders of magnitude. As noted in Section 9.3.2.1.1*, because certain future residents may not grow and ingest their own crops, this pathway may not be applicable to them. Surface soil concentrations of RDX and TNT are the primary contributors to noncarcinogenic hazard estimates at the majority of these sites. Concentrations of RDX in surface soil range from 0.4 to 1,600 μg/g, while concentrations of 2,4,6-TNT range from 0.8 to 43,000 μg/g.

The oral reference dose for 2,4,6-TNT is based on somewhat conflicting data from subchronic and chronic animal bioassays of dogs, mice, and rats. Although data suggest that dogs are the most sensitive and most appropriate species for quantitative risk assessment (USEPA, 1989f), they seem unusually sensitive when compared to

rodents. This sensitivity may be partially attributable to the method of administration (oral capsule) used by Levine et al. (1983). Consequently, EPA calculates the reference dose based on a subchronic LOAEL and application of an uncertainty factor of 1,000, instead of the more traditional 10,000 (USEPA, 1989f). EPA rates confidence in the reference dose as medium, because adverse effects--particularly hematopoietic effects--occur at higher doses in other species, and because of the lack of reproductive data (USEPA, 1992c). Considering the entire available data base, the use of an uncertainty factor of 1,000 seems reasonable.

The principal study on which the reference dose for RDX is based is a 2-year feeding experiment in which concentration-related mortality, cataracts, hepatoxicity, and renal toxicity occurred in treated rats (DOD, 1983). The NOEL for these effects is 0.3 mg/kg/day, and the LOAEL for inflammation of the prostate is 1.5 mg/kg/day. The NOAEL in a lifetime mouse feeding study is 7.0 mg/kg/day (DOD, 1984). In 90-day oral studies, groups of cynomegalus monkeys show central nervous system disturbances, characterized primarily by tonic-clonic convulsions, at 10 mg RDX/kg/day (Martin and Hart, 1974). The NOAEL from this study is 1 mg/kg/day. These findings are relevant, because exposed humans also show central nervous system effects, including convulsions, unconsciousness, and disorientation (USEPA, 1988). EPA considers confidence in both the principal study and the data base to be high (USEPA, 1991). The principal study clearly identifies a concentration-response relationship, a NOAEL, and a LOAEL. Furthermore, the reference dose is supported by subchronic data in nonrodent species, and the data base consists of most relevant toxicological endpoints, including developmental effects.

As in the Baseline RA, pathways 2 and 12 present the greatest potential noncarcinogenic hazards for future residents at Sites 17, 22, and 36. Pathways 5 and 12 present the greatest potential hazards at Sites 18 and 47. Dominant contaminants of concern at Sites 17, 18, 22, 36, and 47 vary from site to site and pathway to pathway.

9.3.2.1.3* Discussion of Conclusions for Lead Uptake/Biokinetic Model. The results of the UBK model indicate that several UMDA sites have lead concentrations that may result in unacceptable exposure levels. These results are generally similar to those presented in the Baseline RA, with the exception of Site 2, which was not previously sampled (Dames & Moore, 1992a). The number of such sites is dependent on how much of the population you want to protect and the blood lead cutoff selected. For example, at four followup fieldwork sites (Sites 2, 17, 19, and 22), less than 95 percent of the population is predicted to have a blood lead level below the CDC-recommended cutoff of 10 μg/dL or below 15 μg/dL. If the degree of protectiveness selected is 99 percent of the population, then seven followup fieldwork sites (Sites 2, 15, 17, 19, 22, 26, and 47) are predicted to have less than 99 percent of the population below a blood lead level of 10 μg/dL; and four followup fieldwork sites (Sites 2, 17, 19, and 22) are predicted to have less than 99 percent of the population below a blood lead level of 15 μg/dL.

9.3.2.2* Future Military Land Use Conditions at Sites in Operable Unit B. Pathway 3 (inhalation of contaminated soil as airborne dust) is evaluated for future military personnel using followup fieldwork sites in Operable Unit B for tank training exercises. At Site 17, pathway 3 carcinogenic risks are below the lower bound of the NCP risk range of 1E-04 to 1E-06, and noncarcinogenic hazards are less than 1. At two of the remaining three followup fieldwork Operable Unit B sites--Sites 18 and 19--pathway 3 carcinogenic risk estimates are within the NCP risk range of 1E-04 to 1E-06, and noncarcinogenic hazards exceed 1. At Site 15, pathway 3 carcinogenic risk estimates exceed the upper bound of the NCP risk range of 1E-04 to 1E-06, and noncarcinogenic hazards exceed 1. These results are generally slightly less than those calculated in the Baseline RA (Dames & Moore, 1992a).

Chromium is generally the dominant contaminant of concern for both carcinogenic and noncarcinogenic effects on future military personnel exposed to Operable Unit B contamination via pathway 3. If chromium is not considered, estimated carcinogenic risks range from 1E-06 to 2E-05, decreasing by 1 order of

magnitude; noncarcinogenic hazards range from 4E-03 to 10, decreasing by 1 to 2 orders of magnitude and falling below 1 at Site 18. Only a few (two to four) samples were collected from surface soil at sites where chromium is the dominant contaminant, but chromium concentrations--ranging from 25 to 8,460 $\mu g/g$--generally greatly exceed the background soil concentration of 32.7 $\mu g/g$.

The inhalation reference dose for chromium is calculated from an air concentration listed in HEAST (USEPA, 1991d). EPA's ORD is reviewing the inhalation reference dose concept and has not reinstated inhalation reference doses on the IRIS data base. The reasons for the ORD review include the reputed wide variation in the toxicological response to inhalable contaminant exposure because of the complex structure and mechanics of the respiratory system. Thus, though the reference air concentration cited in HEAST is based on a moderately well-designed occupational study in workers exposed to chromic (VI) acid (Lindberg and Hedenstierna, 1983), the deposited reference dose cannot be accurately determined based on this air concentration. The resulting confidence in the calculated inhalation reference dose is low.

EPA removed the inhalation slope factors for respirable carcinogens from IRIS on January 1, 1991, but unit risks are still listed. The basis for the unit risk for chromium VI (the only carcinogenic form of chromium) is a series of occupational studies that consistently show positive concentration-response relationships between chromium exposure and lung cancer induction (USEPA, 1992), warranting an EPA Group A classification (human carcinogen). The study used for unit risk determination (Mancuso, 1975) was generally well conducted, but contains several factors that may have either overestimated or underestimated risk. The use of older exposure data (when occupational air concentrations were not well monitored) and the assumption that worker smoking frequency is the same as the general population probably contribute to overestimation of carcinogenic risk. The risk for chromium VI, based on concentration-response data for total chromium (chromium III and VI), is probably underestimated. EPA proposes that the extent of overestimation and underestimation is approximately equal; therefore, high confidence is placed in the

unit risk (USEPA, 1984). However, because of the factors discussed above, confidence in the inhalation slope factor derived from the unit risk value is considered low.

9.3.2.4* Dominant Contaminants of Concern. Although the contaminants that significantly contribute to risks or hazards may have shifted for a few sites based on followup fieldwork, in general, the major contributors remained the same as those discussed in the Baseline RA (i.e., arsenic, RDX, 2,4,6-TNT, and chromium for both risks and hazards).

Of the 64 contaminants of concern in soil or groundwater at one or more UMDA sites, 29 significantly contribute to risk or hazard estimates via one or more pathways. These 29 contaminants are listed in Table 9-4* according to the sites and pathways at which they dominate carcinogenic risks or noncarcinogenic hazard indices. In addition, as discussed in Section 9.3.2.1.3*, several UMDA sites may have lead concentrations that could result in unacceptable exposure levels. Eight contaminants significantly contribute to carcinogenic risks only, while 11 significantly contribute to noncarcinogenic hazards only. Ten contaminants significantly contribute to both carcinogenic risks and noncarcinogenic hazards. Although 29 dominant contaminants of concern are identified, the following discussion of confidence in the health-based criteria focuses on those contaminants that present the greatest impacts on human health. Information about confidence in the reference dose or weight-of-evidence classifications for the other dominant contaminants of concern is provided in Appendix D of the Baseline RA.

9.3.2.4.1* Carcinogenic Risks. Of the 16 contaminants that significantly contribute to carcinogenic risks, arsenic, RDX, 2,4,6-TNT, and chromium are the major contaminants of concern for the pathways and sites at which carcinogenic risks are within the NCP risk range of 1E-04 to 1E-06 or exceed the upper bound of this range. Weight-of evidence classifications and other issues related to these contaminants are discussed in detail in Section 9.3.2.1.1*. In the Baseline RA, nickel was a significant contributor to risks at Site 18; however, with the addition of followup fieldwork results,

the exposure point concentration of nickel--and, therefore, the calculated risk--was lower, and nickel no longer significantly contributes to risks at Site 18. The remaining results are the same as those presented in the Baseline RA (Dames & Moore, 1992a).

Five of the 16 contaminants that significantly contribute to carcinogenic risks--as listed below--affect risks only via one or two pathways at one site. Note that some contaminants--though contributing to the total carcinogenic risk estimates that are within or exceed the NCP risk range of 1E-04 to 1E-06--have chemical-specific risks (provided in parentheses below) that are less than the lower bound of this range.

- Benzene--Carcinogenic risks for future residents via pathway 6 (inhalation of volatile contaminants from groundwater while showering) at Sites 8 and 31 (risk = 4E-06). Note that benzene is the only contaminant of concern for pathway 6 at these two sites. These results are the same as those presented in the Baseline RA (Dames & Moore, 1992a).

- Cadmium--Carcinogenic risks for future residents via pathway 3 (inhalation of contaminated soil as airborne dust) at followup fieldwork Site 19 (risk = 2E-06). These results are the same as those presented in the Baseline RA (Dames & Moore, 1992a).

- Trichloroethylene--As in the Baseline RA, carcinogenic risk for future residents via pathway 6 at Sites 4 and 67 flood gravel aquifer, and followup fieldwork Site 47 (risk = 2E-06). Note that trichloroethylene is the only contaminant of concern for pathway 6 at these three sites. The inhalation unit risk for trichloroethylene is a source of continuing controversy because of questions regarding the most appropriate data base for risk estimation and the best allometric method for interspecies extrapolation (USEPA, 1987; Ris, 1991). Furthermore, EPA is debating whether the B2 or C weight-of-evidence classification is more appropriate (Ris, 1991). The various assessments for trichloroethylene do not clearly indicate if risk is underestimated or overestimated.

- bis(2-Ethylhexyl)phthalate--Carcinogenic risk for future residents via pathways 2 (soil ingestion) and 12 (crop ingestion) at Site 37 (risks = 6E-06 and 1E-04, respectively). Note that Site 37 is the only site at which DEHP is identified as a contaminant of concern in surface soil or groundwater. This contaminant induces liver cancer and hepatic nodules in rats and mice (Reddy and Lalwani, 1983; NTP, 1982). Because primates may be less sensitive to neoplasia from chemicals such as this DEHP, the calculated slope factor may overestimate human health risk. These results are the same as those presented in the Baseline RA (Dames & Moore, 1992a).

- PAHs--Carcinogenic risk for future residents via pathways 2 and 12 at followup fieldwork Sites 12 (risks = 3E-06 and 2E-05, respectively) and 47 (risks = 1E-05 and 7E-05, respectively). These are the only two sites at which PAHs are detected in surface soil or groundwater. Because PAHs were not previously detected in soil at Site 12, they were not listed as significant contaminants for Site 12 in the Baseline RA.

The remaining contaminants listed in Table 9-4* as dominant contaminants of concern for carcinogenic effects are significant at randomly distributed sites under various pathways. For example, beryllium is a dominant contaminant of concern for carcinogenic effects at 10 sites under three different pathways. Beryllium was not listed as a significant contaminant for Site 22 in the Baseline RA, because it was not previously detected at this site. Beryllium is classified as Group B2 (probable human carcinogen) on the basis of tumor induction in animals administered beryllium salts by inhalation or by intravenous or intramedullary injection (USEPA, 1992c). Analysis of the only available oral study (Schroeder and Mitchener, 1975) does not indicate a statistically significant increase in gross tumors in rats exposed for life to beryllium sulfate in drinking water. However, EPA uses this study as the basis for an oral slope factor, because the tumor incidence is not significantly increased (USEPA, 1992c).

Therefore, the oral slope factor is suspect because of the lack of adequate route-specific data.

2,4-DNT is a dominant contaminant of concern for carcinogenic effects at seven sites under four pathways, and 2,6-DNT is a dominant contaminant of concern for carcinogenic effects at three sites under two pathways. In the Baseline RA, 2,6-DNT was not detected at Site 15, but is a significant contaminant at this site with the addition of followup fieldwork results. Although mixed isomer DNT (containing primarily the 2,4 isomer) and 2,4-DNT have been extensively investigated for carcinogenicity (USEPA, 1992d), less is known about the 2,6 isomer. The human oral slope factor is based on a lifetime bioassay (Ellis et al., 1979) in which rats received a mixture containing 98.5 to 99 percent 2,4-DNT and 1 to 1.5 percent 2,6-DNT (Lee et al., 1985; USEPA, 1992c). The slope factor is applicable to 2,4-DNT, technical grade DNT, and--by default--2,6-DNT (USEPA, 1992c). Results of subsequent studies (Leonard et al., 1983; 1986) suggest that 2,6-DNT may be a complete hepatocarcinogen, whereas the 2,4 isomer is active exclusively as a tumor promoter; 2,6-DNT may be 10 times more potent a carcinogen than 2,4-DNT (USEPA, 1992c). The use of the same potency factor for each isomer is probably misleading, and the current criterion probably underestimates the health risk attributable to 2,6-DNT.

9.3.2.4.2* Noncarcinogenic Hazards. Of the 20 contaminants that significantly contribute to noncarcinogenic hazards (Table 9-4*), arsenic, RDX, 2,4,6-TNT, and chromium are the major contaminants of concern for the pathways and sites at which the multipathway noncarcinogenic hazard exceeds 1. These were also the major contaminants listed in the Baseline RA. Confidence in the reference dose and other issues related to these contaminants is discussed in detail in Section 9.3.2.1.2*. In the Baseline RA, nickel was a significant contributor to hazards at Site 18; however, with the addition of followup fieldwork results, the exposure point concentration of nickel--and, therefore, the hazard quotient--was lowered, and nickel no longer significantly contributes to the hazard index at Site 18.

Eight of the 20 contaminants that significantly contribute to noncarcinogenic hazards--as listed below--affect hazards via only one or two pathways at one site. Note that some contaminants, though contributing to the total multipathway noncarcinogenic hazard estimates that exceed 1, have chemical-specific hazards (provided in parentheses below) of less than 1.

- Barium--As in the Baseline RA, noncarcinogenic hazards for future residents via pathway 2 (soil ingestion) at Site 32 Location II (hazard index = 1).
- bis(2-Ethylhexyl)phthalate--As in the Baseline RA, noncarcinogenic hazards for future residents via pathway 12 (crop ingestion) at Site 37 (hazard index = 9E-01).
- 2,6-DNT--As in the Baseline RA, noncarcinogenic hazards for future residents via pathway 12 at Site 13 (hazard index = 3). 2,6-DNT is the only contaminant of concern at Site 13 that significantly contributes to noncarcinogenic hazards via pathway 12.
- Mercury--As in the Baseline RA, noncarcinogenic hazards for future residents via pathway 12 at Sites 13 and 57 Location II (hazard index = 2).
- Nitrite/nitrate--As in the Baseline RA, noncarcinogenic hazards for future residents via pathway 5 (ingestion of contaminated drinking water) at Sites 8 and 31 (hazard index = 0.3).
- Selenium--As in the Baseline RA, noncarcinogenic hazards for future residents via pathway 5 at followup fieldwork Site 11 (hazard index = 2E-01).
- Tetryl--As in the Baseline RA, noncarcinogenic hazards for future residents via pathway 12 at Sites 13 and 57 Location II (hazard index = 1).

- Zinc--As in the Baseline RA, noncarcinogenic hazards for future residents via pathway 2 at Site 32 Location II (hazard index = 1E-01).

The remaining eight contaminants listed in Table 9-4* as dominant contaminants of concern for noncarcinogenic effects are significant at randomly distributed sites under various pathways. These contaminants are the same as those discussed in the Baseline RA. Confidence in the reference dose for some of these contaminants is summarized below:

- Antimony--The oral reference dose is based on a lifetime rat study (Schroeder et al., 1970) using antimony tartrate. The supporting data base, including toxicological information on other antimony salts, is limited. Consequently, confidence in the reference dose is low (USEPA, 1992c).

- Cadmium--The oral reference dose is based on a well-documented human renal wet weight required of the expression of the most sensitive endpoint, proteinuria (USEPA, 1992c). The authors of a recent toxicokinetic model (USEPA, 1985), who assume a 0.01 percent daily cadmium elimination rate, determine that a daily dietary level of 1E-02 mg/kg/day is the highest level not associated with an elevated renal wet weight and subsequent proteinuria. EPA applies an uncertainty factor of 10 to account for susceptible individuals (USEPA, 1992). Because the NOAEL is derived from a large toxicological and toxicokinetic data base in both humans and animals, confidence in the reference dose is high.

- Cobalt--EPA Region III, which cites the low oral reference dose for cobalt used in the Baseline RA (USEPA, 1991g), considers the reference dose obsolete and possibly about 2 orders of magnitude too low (Smith, 1992). The reference dose is based on an EPA memorandum (USEPA, 1990) concerning sensitization reactions in human volunteers. According to this memorandum, Veien et al. (1987) orally challenged 47 cobalt- and nickel-exposed workers with 1 milligram cobalt (as cobalt sulfate)

once a week for 3 weeks. The challenge was used as a potential treatment for eczema in the workers. A total of 28 workers developed dermatitis. Using both the oral challenge and dermal patch tests, Veien et al. (1987) determine that the cobalt allergy is systemic. When divided by a standard body weight of 70 kilograms, the oral dose is 0.014 mg/kg/day. Application of an uncertainty factor of 1,000 (10 each for the use of a LOAEL, use of acute data, and protection of sensitive individuals) results in an interim oral reference dose of 1E-05 mg/kg/day. EPA (1990) proposes that confidence in the reference dose is low, because a NOAEL is not identified and prior exposure to nickel may sensitize individuals to cobalt.

- Copper--The EPA Region III oral reference dose is calculated from the MCL, assuming that the average human weighs 70 kilograms and consumes 2 liters of water daily. EPA's drinking water criteria document for copper indicates that data are not adequate for the assessment of an oral reference dose (USEPA, 1991d). Because the MCL is based on organoleptic criteria, little confidence can be placed in the reference dose and the overestimation or underestimation of hazards cannot be determined.

- 1,3,5-TNB--The oral reference dose is based on a subchronic study in the structural analog 1,3-DNB (Cody et al., 1981) and is adjusted for molecular weight differences. Because of limitations of the 1,3-DNB data base, and further uncertainties in criteria determination by analogy, confidence in the 1,3,5-TNB reference dose is very low.

- Vanadium--The oral reference dose is very questionable because of an internally inconsistent data base (Schroeder et al., 1970: Stokinger et al., 1953; Domingo et al., 1985; Susic and Kentera, 1986).

9.4* UNCERTAINTIES

The majority of uncertainties associated with the Baseline RA do not change as a result of the followup fieldwork and are fully discussed in Section 7.5 of the Baseline RA. Those uncertainties that are affected by the followup fieldwork are summarized in Section 7.5*.

Because of the site-specific uncertainties discussed in Section 7.5 of the Baseline RA and Section 7.5* of the addendum, as well as those uncertainties inherent to the risk assessment process, the Baseline RA and addendum should not be considered as an absolute measurement of the risks and hazards posed to current and future populations by exposure to site-related contaminants. Instead, they present a generally conservative assessment designed to evaluate risks that might exist under the assumed exposure conditions if no remediation or institutional controls are applied at a site, and to help determine the need for remedial action, on a relative basis.

9.5* PRELIMINARY REMEDIATION GOALS

The PRGs developed for surface soil and groundwater based on land use scenarios, exposure pathways, and specific exposure assumptions are presented in the Baseline RA. These tables slightly differ from those presented in the Baseline RA in that PRGs are included for the four new contaminants of concern based on followup fieldwork results--1,1,1-trichloroethane (previously a contaminant of concern only in subsurface soil, now also a contaminant of concern in surface soil), benzo(a)pyrene, benzo(g,h,i)perylene, and indeno(1,2,3-cd)pyrene. All other PRGs are the same as those presented in the corresponding Baseline RA tables.

9.5.2.3* PRGs for Lead. The UBK model is run using a target groundwater PRG for lead of 10 μg/L. This concentration is selected as the target groundwater PRG, because the exposure point concentrations for lead in groundwater at all sites at UMDA are below 10 μg/L. Therefore, it may not be necessary to consider remedial alternatives for lead in groundwater if a PRG of 10 μg/L is selected. A close evaluation of the UBK model indicates that the output is mainly a function of soil

concentration and that alteration of the target PRG for groundwater (i.e., 10 μg/L) does not significantly impact the soil PRG.

Based on application of the UBK model, two potential PRGs for lead in UMDA soil are identified--200 and 500 mg/kg total lead. At a soil concentration of 200 mg/kg lead, more than 99.8 percent of an exposed sensitive population (young children) is expected to have blood lead levels of less than or equal to 10 μg/dL. Fifteen sites (Sites 1, 13, 14, 32 Location II, 37, 39, and 46, and followup fieldwork Sites 2, 15, 17, 18, 19, 22, 26, and 47) have lead exposure point concentrations that exceed 200 mg/kg, indicating that they may potentially require consideration of remedial alternatives if a lead PRG of 200 mg/kg is selected. At a soil concentration of 500 mg/kg, approximately 92 percent of the children are expected to have blood lead levels of less than or equal to 10 μd/dL, and more than 99.5 percent of the children are expected to have blood lead levels of less than or equal to 15 μg/dL. Eight sites (Sites 1 and 32 Location II, and followup fieldwork Sites 2, 15, 17, 19, 22, and 26) have lead exposure point concentrations that exceed 500 mg/kg, indicating that they may require consideration of remedial alternatives if a PRG of 500 mg/kg is selected.

TABLE 9-2*

Summary of Baseline Risk Assessment for UMDA - Current Land Use Scenario

Receptor	Exposure Pathway	Contributing Sites	Contaminants of Concern (Soil--to a depth of 2 feet)	Risk Characterization
Worker Near Explosives Washout Area	Inhalation of Dust	4, 5**, 9, 15**, 16, 18**, 19**, 21, 26**, 31, 36**, 38, 39, 47**, 52, 57 II, 57 III, 60, and 67	Metals, cyanide, explosives, nitrite/nitrate, VOAs, semi-VOAs, pesticides, and PCBs.	The potential carcinogenic risk and noncarcinogenic hazard for the dust inhalation pathway are 3E-08 and 4E-03, respectively.
Open Detonation Pit and Open Burning Tray Workers	Inhalation of Dust	15**, 16, 19**, 32 I, 57 I, and 57 II	Metals, cyanide, explosives, and nitrite/nitrate.	The potential carcinogenic risk and noncarcinogenic hazard for the dust inhalation pathway are 4E-07 and 2E-01, respectively.
Target Range Users	Incidental Soil Ingestion Inhalation of Dust	15**, 16, 57 III, and 60	Metals, cyanide, explosives, and nitrite/nitrate.	The multiple pathway potential carcinogenic risk and noncarcinogenic hazard are 7E-10 and 7E-04, respectively.
Worker Near SW Warehouse Area	Incidental Soil Ingestion Inhalation of Dust	1, 15**, 16, 19**, 21, 37, 46, and 57 III	Metals, cyanide, explosives, nitrite/nitrate, VOAs, and semi-VOAs.	The multiple pathway potential carcinogenic risk and noncarcinogenic hazard are 3E-08 and 6E-03, respectively.
DRMO Worker	Incidental Soil Ingestion Inhalation of Dust	15**, 16, 19**, 21, 22**, 27, 31, 38, and 57 III	Metals, cyanide, explosives, nitrite/nitrate, semi-VOAs, and pesticides.	The multiple pathway potential carcinogenic risk and noncarcinogenic hazard are 8E-09 and 7E-03, respectively.
Worker in Pesticide Bldg.	Inhalation of Dust	15**, 16, 19**, 21, 22**, 31, 38, 57 III and 60	Metals, cyanide, explosives, nitrite/nitrate, semi-VOAs, and pesticides.	The potential carcinogenic risk and noncarcinogenic hazard for the dust inhalation pathway are 2E-10 and 4E-05, respectively.
Workers at Bldgs 612 & 617	Inhalation of Dust	9, 15**, 16, 18**, 19**, 38, 41, 45 (Bldg 612), 45 (Bldg (617), 57 I, and 57 II	Metals, cyanide, explosives, VOAs, semi-VOAs, and nitrite/nitrate.	The potential carcinogenic risk and noncarcinogenic hazard for the dust inhalation pathway are 7E-08 and 8E-03, respectively.
Eastern Boundary Residents	Inhalation of Dust	4, 5**, 9, 10, 15**, 16, 18**, 19**, 21, 25 I, 26**, 31, 38, 39, 47**, 52, 57 I, 57 II, 57 III, 60, 67, and 81 I	Metals, cyanide, explosives, nitrite/nitrate, semi-VOAs, pesticides, and PCBs.	The potential carcinogenic risk and noncarcinogenic hazard for the dust inhalation pathway are 3E-08 and 3E-03, respectively.
Hermiston Residents	Inhalation of Dust	9, 10, 15**, 16, 18**, 19**, 21, 22**, 25 I, 25 II, 26**, 31, 38, 39, 41, 52, 53, 57 I, 57 II, 57 III, 60, and 81 I	Metals, cyanide, explosives, nitrite/nitrate, semi-VOAs, and pesticides.	The potential carcinogenic risk and noncarcinogenic hazard for the dust inhalation pathway are 2E-08 and 2E-03, respectively.
Western Boundary Residents	Inhalation of Dust	15**, 16, and 19**	Metals, cyanide, explosives, and nitrite/nitrate.	The potential carcinogenic risk and noncarcinogenic hazard for the dust inhalation pathway are 4E-08 and 2E-02, respectively.
Irrigon Residents	Inhalation of Dust	15**, 16, and 19**	Metals, cyanide, explosives, and nitrite/nitrate.	The potential carcinogenic risk and noncarcinogenic hazard for the dust inhalation pathway are 5E-09 and 2E-03, respectively.

* - Replaces original Table 9-2 in the Final Baseline RA; Dames & Moore, 1992a.
** - Site at which followup fieldwork was conducted.

TABLE 9-3*

Summary of Baseline Risk Assessment for UMDA - Future Land Use Scenario

Site No.	Site Name	Contaminants of Concern	Exposure Assessment	Risk Characterization
OPERABLE UNIT A				
4	Explosive Washout Lagoons	Groundwater: flood gravel aquifer--metals, explosives, nitrite/nitrate, and VOAs; basalt aquifer--metals and explosives. Soil: shallow (to a depth of 2 feet)--explosives and nitrite/nitrate; shallow and subsurface (to a depth of 10 feet)--explosives and nitrite/nitrate.	Pathways 1, 2, 3, 5, 6, 7, and 12 are complete and quantified for the future residential land use scenario.	The multiple pathway potential carcinogenic risk and noncarcinogenic hazard for Site 4 (soil and the flood gravel aquifer) for the future residential land use scenario are 2E-01 and 9E+03, respectively. The multiple pathway potential carcinogenic risk and noncarcinogenic hazard for Site 4 (soil and the basalt aquifer) for the future residential land use scenario are 2E-01 and 9E+03, respectively. Pathway 12 (crop ingestion) presents the greatest potential risk and hazard for both the flood gravel and basalt aquifers.
** 5	Explosive Washout Plant	Soil: shallow (to a depth of 2 feet)--explosives and nitrite/nitrate; shallow and subsurface (to a depth of 10 feet)--explosives and nitrite/nitrate	Pathways 1, 2, 3, and 12 are complete and quantified for the future residential land use scenario.	The multiple pathway potential carcinogenic risk and noncarcinogenic hazard for Site 5 for the future residential land use scenario are 1E-01 and 6E+03, respectively. Pathway 12 (crop ingestion) presents the greatest potential risk and hazard.
** 36	Bldg 493-Paint Sludge Discharge Area	Soil: shallow (to a depth of 2 feet)--metals and nitrite/nitrate.	Pathways 2, 3, and 12 are complete and quantified for the future residential land use scenario.	The multiple pathway potential carcinogenic risk and noncarcinogenic hazard for Site 36 for the future residential land use scenario are 4E-07 and 2E+01, respectively. Pathways 2 (soil ingestion) and 12 (crop ingestion) present the greatest potential hazard.
** 47	Boiler/Laundry Effluent Discharge Site	Groundwater: flood gravel aquifer--metals, explosives, nitrite/nitrate, and VOAs; basalt aquifer--metals and explosives. Soil: shallow (to a depth of 2 feet)--metals, nitrite/nitrate, semi-VOAs, and pesticides/PCBs; shallow and subsurface (to a depth of 10 feet)--metals, nitrite/nitrate, semi-VOAs, and pesticide/PCBs.	Pathways 1, 2, 3, 5, 6, 7 and 12 are complete and quantified for the future residential land use scenario.	The multiple pathway potential carcinogenic risk and noncarcinogenic hazard for Site 47 (soil and flood gravel aquifer) for the future residential land use scenario are 2E-03 and 7E+01, respectively. The multiple pathway potential carcinogenic risk and noncarcinogenic hazard for Site 47 (soil and basalt aquifer) for the future residential land use scenario are 4E-03 and 4E+01, respectively. Pathway 5 (groundwater ingestion) presents the greatest potential risk for both the flood gravel and basalt aquifers. Pathways 5 (groundwater ingestion) and 12 (crop ingestion) present the greatest potential hazard for both the flood gravel and basalt aquifers.
52	Coyote Coulee Discharge Gullies	Soil: shallow (to a depth of 2 feet)--metals and explosives	Pathways 1, 2, 3, and 12 are complete and quantified for the future residential land use scenario.	The multiple pathway potential carcinogenic risk and noncarcinogenic hazard for Site 52 for the future residential land use scenario are 5E-04 and 4, respectively. Pathway 12 (crop ingestion) presents the greatest potential risk and hazard.

TABLE 9-3* (cont'd)

Summary of Baseline Risk Assessment for UMDA - Future Land Use Scenario

Site No.	Site Name	Contaminants of Concern	Exposure Assessment	Risk Characterization
67	Bldg 493-Brass Cleaning Operations Area	Groundwater: flood gravel aquifer--metals, explosives, nitrite/nitrate, and VOAs; basalt aquifer--metals and explosives. Soil: shallow (to a depth of 2 feet)--metals; shallow and subsurface (to a depth of 10 feet)--metals.	Pathways 2, 3, 5, 6, 7, and 12 are complete and quantified for the future residential land use scenario.	The multiple pathway potential carcinogenic risk and noncarcinogenic hazard for Site 67 (soil and the flood gravel aquifer) for the future residential land use scenario are 2E-03 and 7E+01, respectively. The multiple pathway potential carcinogenic risk and noncarcinogenic hazard for Site 67 (soil and the basalt aquifer) for the future residential land use scenario are 3E-03 and 4E+01, respectively. Pathway 5 (groundwater ingestion) presents the greatest potential risks for both the flood gravel and basalt aquifers. Pathways 5 (groundwater ingestion) and 12 (crop ingestion) present the greatest potential hazards for both the flood gravel and basalt aquifers.
OPERABLE UNIT B				
7	Aniline Pit	Soil: subsurface (to a depth of 10 feet)--none detected.	No complete pathways, because no contaminants of concern are detected.	No risks or hazards are calculated, because no complete exposure pathways are identified.
8	Acid Pit	Groundwater: metals, explosives, nitrite/nitrate, and VOAs. Soil: subsurface (to a depth of 10 feet)--metals.	Pathways 5, 6, 7, and 12 are complete and quantified for the future residential land use scenario.	The multiple pathway potential carcinogenic risk and noncarcinogenic hazard for Site 8 for the future residential land use scenario are 6E-04 and 3, respectively. Pathway 5 (groundwater ingestion) presents the greatest potential risk and hazard.
13	Smoke Canister Disposal Area	Groundwater: metals. Soil: shallow (to a depth of 2 feet)--metals and explosives; shallow and subsurface (to a depth of 10 feet)--metals and explosives.	Pathways 1, 2, 3, 5, and 12 are complete and quantified for the future residential land use scenario.	The multiple pathway potential carcinogenic risk and noncarcinogenic hazard for Site 13 for the future residential land use scenario are 2E-03 and 7, respectively. Pathways 5 (groundwater ingestion) and 12 (crop ingestion) present the greatest potential risk and hazard.
			Pathway 3 is complete and quantified for the future military land use scenario.	The potential carcinogenic risk and noncarcinogenic hazard for Site 13 for the future military land use scenario (Pathway 3, dust inhalation) are 2E-07 and 9E-02, respectively.
14	Flare and Fuse Disposal Area/Bird Cage Burn Area	Groundwater: metals. Soil: shallow (to a depth of 2 feet)--metals; shallow and subsurface (to a depth of 10 feet)--metals and nitrite/nitrate.	Pathways 2, 3, 5, and 12 are complete and quantified for the future residential land use scenario.	The multiple pathway potential carcinogenic risk and noncarcinogenic hazard for Site 14 for the future residential land use scenario are 7E-04 and 4, respectively. Pathway 5 (groundwater ingestion) presents the greatest potential risk and hazard.
			Pathway 3 is complete and quantified for the future military land use scenario.	The potential carcinogenic risk and noncarcinogenic hazard for Site 14 for the future military land use scenario (Pathway 3, dust inhalation) are 2E-06 and 2, respectively, and are due to the presence of chromium.

TABLE 9-3* (cont'd)

Summary of Baseline Risk Assessment for UMDA - Future Land Use Scenario

Site No.	Site Name	Contaminants of Concern	Exposure Assessment	Risk Characterization
** 15	TNT Sludge Burial and Burn Area	Groundwater: metals. Soil: shallow (to a depth of 2 feet)--metals, explosives, and nitrite/nitrate; shallow and subsurface (to a depth of 10 feet)--metals, explosives, nitrite/nitrate, VOAs, and semi-VOAs.	Pathways 1, 2, 3, 5, and 12 are complete and quantified for the future residential land use scenario.	The multiple pathway potential carcinogenic risk and noncarcinogenic hazard for Site 15 for the future residential land use scenario are 3E-02 and 1E+03, respectively. Pathway 12 (crop ingestion) presents the greatest potential risk and hazard.
			Pathway 3 is complete and quantified for the future military land use scenario.	The potential carcinogenic risk and noncarcinogenic hazard for Site 15 for the future military land use scenario (Pathway 3, dust inhalation) are 3E-04 and 2E+02, respectively, and are mainly due to the presence of chromium.
16	Open Detonation Pits	Groundwater: metals. Soil: shallow (to a depth of 2 feet)--metals, cyanide, explosives, and nitrite/nitrate; shallow and subsurface (to a depth of 10 feet)--metals, cyanide, explosives, nitrite/nitrate.	Pathways 1, 2, 3, 5, and 12 are complete and quantified for the future residential land use scenario.	The multiple pathway potential carcinogenic risk and noncarcinogenic hazard for Site 16 for the future residential land use scenario are 2E-03 and 2E+01, respectively. Pathways 5 (groundwater ingestion) and 12 (crop ingestion) present the greatest potential risks. Pathways 2 (soil ingestion), 5 (groundwater ingestion), and 12 (crop ingestion) present the greatest potential hazards.
			Pathway 3 is complete and quantified for the future military land use scenario.	The potential carcinogenic risk and noncarcinogenic hazard for Site 16 for the future military land use scenario (Pathway 3, dust inhalation) are 4E-08 and 1E-01, respectively.
** 17	Aboveground OD Area	Soil: shallow (to a depth of 2 feet)--metals and explosives.	Pathways 1, 2, 3, and 12 are complete and quantified for the future residential land use scenario.	The multiple pathway potential carcinogenic risk and noncarcinogenic hazard for Site 17 for the future residential land use scenario are 4E-03 and 5E+01, respectively. Pathway 12 (crop ingestion) presents the greatest potential risk. Pathways 2 (soil ingestion) and 12 (crop ingestion) present the greatest potential hazard.
			Pathway 3 is complete and quantified for the future military land use scenario.	The potential carcinogenic risk and noncarcinogenic hazard for Site 17 for the future military land use scenario (Pathway 3, dust inhalation) are 3E-08 and 5E-04, respectively.
** 18	Dunnage Pits	Groundwater: metals. Soil: shallow (to a depth of 2 feet)--metals, VOAs, semi-VOAs, and pesticides; shallow and subsurface (to a depth of 10 feet)--metals, VOAs, semi-VOAs, pesticides, and PCBs.	Pathways 2, 3, 5, and 12 are complete and quantified for the future residential land use scenario.	The multiple pathway potential carcinogenic risk and noncarcinogenic hazard for Site 18 for the future residential land use scenario are 8E-04 and 5, respectively. Pathway 5 (groundwater ingestion) presents the greatest potential risk. Pathways 5 (groundwater ingestion) and 12 (crop ingestion) present the greatest potential hazards.

TABLE 9-3* (cont'd)

Summary of Baseline Risk Assessment for UMDA - Future Land Use Scenario

Site No.	Site Name	Contaminants of Concern	Exposure Assessment	Risk Characterization
** 18, cont'd	Dunnage Pits		Pathway 3 is complete and quantified for the future military land use scenario.	The potential carcinogenic risk and noncarcinogenic hazard for Site 18 for the future military land use scenario (Pathway 3, dust inhalation) are 3E-06 and 3, respectively, which are mainly due to the presence of chromium.
** 19	Open Burning Trenches/Pads	Groundwater: metals and explosives. Soil: shallow (to a depth of 2 feet)--metals, explosives, and nitrite/nitrate; shallow and subsurface (to a depth of 10 feet)--metals, explosives, nitrite/nitrate, and VOAs.	Pathways 1, 2, 3, 5, 7, and 12 are complete and quantified for the future residential land use scenario.	The multiple pathway potential carcinogenic risk and noncarcinogenic hazard for Site 19 for the future residential land use scenario are 3E-01 and 7E+04, respectively. Pathway 12 (crop ingestion) presents the greatest potential risk and hazard.
			Pathway 3 is complete and quantified for the future military land use scenario.	The potential carcinogenic risk and noncarcinogenic hazard for Site 19 for the future military land use scenario (Pathway 3, dust inhalation) are 1E-05 and 8, respectively. The potential carcinogenic risk of 1E-05 is mainly due to the presence of arsenic, cadmium, and chromium. The noncarcinogenic hazard of 8 is mainly due to the presence of barium and chromium.
21	Missile Fuel Storage Areas	Soil: shallow (to a depth of 2 feet)--nitrite/nitrate; shallow and subsurface (to a depth of 10 feet)--metals, nitrite/nitrate.	Pathways 2, 3, and 12 are complete and quantified for the future residential land use scenario.	A multiple pathway potential carcinogenic risk was not calculated because a slope factor is not available for nitrite/nitrate, the only contaminant of concern in Site 21 soil. The multiple pathway noncarcinogenic hazard is 3E-05.
			Pathway 3 is complete and quantified for the future military land use scenario.	The potential carcinogenic risk and noncarcinogenic hazard for Site 21 for the future military land use scenario (Pathway 3, dust inhalation) are not calculated because inhalation toxicity criteria are not available for nitrite/nitrate.
31	Pesticide Pits	Groundwater: metals, explosives, nitrite/nitrate, and VOAs. Soil: shallow (to a depth of 2 feet)--metals, explosives, nitrite/nitrate, semi-VOAs, and pesticides; shallow and subsurface (to a depth of 10 feet)--metals, explosives, nitrite/nitrate, VOAs, semi-VOAs, and pesticides.	Residential Land Use Scenario: Pathways 1, 2, 3, 5, 6, 7, 11, and 12 are complete and quantified for the future residential land use scenario.	The multiple pathway potential carcinogenic risk and noncarcinogenic hazard for Site 31 for the future residential land use scenario are 6E-02 and 2E+04, respectively. Pathway 12 (crop ingestion) presents the greatest potential risk and hazard.
			Future Light Industrial Land Use Scenario: Pathways 1, 2, 3, 5, and 8 are complete and quantified for the future light industrial land use scenario.	The multiple pathway potential carcinogenic risk and noncarcinogenic hazard for Site 31 for the future light industrial land use scenario are 7E-04 and 1E+02, respectively. Pathways 1 (dermal absorption of soil contaminants) and 5 (groundwater ingestion) present the greatest potential risk. Pathway 1 (dermal absorption of soil contaminants) presents the greatest potential hazard.

TABLE 9-3* (cont'd)

Summary of Baseline Risk Assessment for UMDA - Future Land Use Scenario

Site No.	Site Name	Contaminants of Concern	Exposure Assessment	Risk Characterization
31, cont'd	Pesticide Pits		Future Military Land Use Scenario: Pathways 1, 2, 3, 5, and 8 are complete and quantified for the future military land use scenario. Only pathway 3 applies to the future tank training exercises at Site 31, but all five pathways may apply to other future military uses at Site 31.	The multiple pathway potential carcinogenic risk and noncarcinogenic hazard for Site 31 for the future military land use scenario are 8E-05 and 9E+01, respectively. Pathways 1 (dermal absorption of soil contaminants) and 5 (groundwater ingestion) present the greatest potential risks. Pathway 1 (dermal absorption of soil contaminants) presents the greatest potential hazard.
			Future Construction Land Use Scenario: Pathways 1, 2, and 3 are complete and quantified for the future construction worker land use scenario.	The multiple pathway potential carcinogenic risk and noncarcinogenic hazard for Site 31 for the future construction land use scenario are 7E-06 and 9, respectively. Pathways 1 (dermal absorption of soil contaminants) and 2 (soil ingestion) present the greatest potential risks. Pathways 1 (dermal absorption of soil contaminants), 2 (soil ingestion), and 3 (dust inhalation) present the greatest potential hazards.
			Future Agricultural Land Use Scenario: Pathways 1, 2, 3, and 8 are complete and quantified for the future agricultural land use scenario.	The multiple pathway potential carcinogenic risk and noncarcinogenic hazard for Site 31 for the future agricultural land use scenario are 1E-04 and 1E+01, respectively. Pathway 1 (dermal absorption of soil contaminants) presents the greatest potential risk and hazard.
			Future Recreational Land Use Scenario: Pathway 10 is complete and quantified for the future recreational land use scenario.	The potential carcinogenic risk and noncarcinogenic hazard for Site 31 for the future recreational land use scenario are 7E-07 and 1E-01, respectively.
32	Open Burning Trays Location I	Soil: shallow (to a depth of 2 feet)--metals, explosives, and nitrite/nitrate.	Pathways 1, 2, 3, and 12 are complete and quantified for the future residential land use scenario.	The multiple pathway potential carcinogenic risk and noncarcinogenic hazard for Site 32 Location I for the future residential land use scenario are 1E-03 and 2, respectively. Pathway 12 (crop ingestion) presents the greatest potential risk and hazard.
			Pathway 3 is complete and quantified for the future military land use scenario.	The potential carcinogenic risk and noncarcinogenic hazard for the future military land use scenario (Pathway 3, dust inhalation) are not calculated because the inhalation slope factors and inhalation reference doses are not available for any of the contaminants of concern.

TABLE 9-3* (cont'd)

Summary of Baseline Risk Assessment for UMDA - Future Land Use Scenario

Site No.	Site Name	Contaminants of Concern	Exposure Assessment	Risk Characterization
32	Open Burning Trays Location II	Soil: shallow (to a depth of 2 feet)--metals, sidential	Pathways 1, 2, 3, and 12 are complete land use scenario.	The multiple pathway potential carcinogenic risk and noncarcinogenic hazard for Site 32 Location II for the future residential land use scenario are 1E-03 and 4, respectively. Pathway 12 (crop ingestion) presents the greatest potential risk. Pathways 2 (soil ingestion) and 12 (crop ingestion) present the greatest potential hazards.
			Pathway 3 is complete and quantified for the future military land use scenario.	The potential carcinogenic risk for Site 32 Location II for the future military land use scenario (Pathway 3, dust inhalation) is not calculated because the inhalation slope factors are not available for any of the contaminants of concern. The potential noncarcinogenic hazard is 1, due to the presence of barium.
38	Pit Field Area	Groundwater: metals. Soil: shallow (to a depth of 2 feet)--metals and explosives; shallow and subsurface (to a depth of 10 feet)--metals, cyanide, and explosives.	Pathways 1, 2, 3, 5, and 12 are complete and quantified for the future residential land use scenario.	The multiple pathway potential carcinogenic risk and noncarcinogenic hazard for Site 38 for the future residential land use scenario are 7E-04 and 8, respectively. Pathway 5 (groundwater ingestion) presents the greatest potential risk. Pathways 5 (groundwater ingestion) and 12 (crop ingestion) present the greatest potential hazards.
			Pathway 3 is complete and quantified for the future military land use scenario.	The potential carcinogenic risk and noncarcinogenic hazard for Site 38 for the future military land use scenario (Pathway 3, (dust inhalation) are 3E-07 and 4E-04, respectively.
41	GB/VX Decontamination Solution Burial Areas	Groundwater: metals. Soil: shallow (to a depth of 2 feet)--metals and semi-VOAs; shallow and subsurface (to a depth of 10 feet)--metals, VOAs, and semi-VOAs.	Pathways 2, 3, 5, and 12 are complete and quantified for the future residential land use scenario.	The multiple pathway potential carcinogenic risk and noncarcinogenic hazard for Site 41 for the future residential land use scenario are 6E-04 and 3, respectively. Pathway 5 (groundwater ingestion) presents the greatest potential risk and hazard.
			Pathway 3 is complete and quantified for the future military land use scenario.	Potential carcinogenic risks and noncarcinogenic hazards are not calculated for pathway 3 because inhalation toxicity criteria are not available for any of the contaminants of concern.
55	Trench/Burn Field	Groundwater: metals. Soil: subsurface (to a depth of 10 feet)--metals and explosives.	Pathways 5 and 12 are complete and quantified for the future residential land use scenario.	The multiple pathway potential carcinogenic risk and noncarcinogenic hazard for Site 55 for the future residential land use scenario are 3E-04 and 2, respectively. Pathway 5 (groundwater ingestion) presents the greatest potential risk and hazard.

TABLE 9-3* (cont'd)

Summary of Baseline Risk Assessment for UMDA - Future Land Use Scenario

Site No.	Site Name	Contaminants of Concern	Exposure Assessment	Risk Characterization
56	Munitions Crate Burn Area	Soil: shallow (to a depth of 2 feet)--metals. shallow and subsurface (to a depth of 10 feet)--metals.	Pathways 2, 3, and 12 are complete and quantified for the future residential land use scenario.	The multiple pathway potential carcinogenic risk and noncarcinogenic hazard for Site 56 for the future residential land use scenario are 3E-05 and 3E-03, respectively. Pathways 2 (soil ingestion) and 12 (crop ingestion) present the greatest potential risk.
			Pathway 3 is complete and quantified for the future military land use scenario.	The potential carcinogenic risk for Site 56 for the future military land use scenario (Pathway 3, dust inhalation) is 7E-09. A potential noncarcinogenic hazard is not calculated for pathway 3 because inhalation reference doses are not available for any of the contaminants of concern.
57	Former Pit Area Location I	Groundwater: metals. Soil: shallow (to a depth of 2 feet)--metals; shallow and subsurface (to a depth of 10 feet)--metals and VOAS.	Pathways 2, 3, 5, and 12 are complete and quantified for future residential land use scenario.	The multiple pathway potential carcinogenic risk and noncarcinogenic hazard for Site 57 Location I for the future residential land use scenario are 6E-04 and 3, respectively. Pathway 5 (groundwater ingestion) presents the greatest potential risk and hazard.
			Pathway 3 is complete and quantified for the future military land use scenario.	The potential carcinogenic risk for Site 57 Location I for the future military land use scenario (pathway 3, dust inhalation) is not calculated because the inhalation slope factors are not available for any of the contaminants of concern. The potential noncarcinogenic hazard is 5E-05.
57	Former Pit Area Location II	Groundwater: metals. Soil: shallow (to a depth of 2 feet)--metals and explosives; shallow and subsurface (to a depth of 10 feet)--metals, explosives, and nitrite/nitrate.	Pathways 1, 2, 3, 5, and 12 are complete and quantified for the future residential land use scenario.	The multiple pathway potential carcinogenic risk and noncarcinogenic hazard for Site 57 Location II for the future residential land use scenario are 6E-04 and 6, respectively. Pathway 5 (groundwater ingestion) presents the greatest potential risk. Pathways 5 (groundwater ingestion) and 12 (crop ingestion) present the greatest potential hazards.
			Pathway 3 is complete and quantified for the future military land use scenario.	The potential carcinogenic risk and noncarcinogenic hazard for Site 57 Location II for the future military land use scenario (pathway 3, dust inhalation) are 4E-08 and 1E-03, respectively.
57	Former Pit Area Location III	Groundwater: metals. Soil: shallow (to a depth of 2 feet)--metals; shallow and subsurface (to a depth of 10 feet)--metals and explosives.	Pathways 2, 3, 5, and 12 are complete and quantified for the future residential land use scenario.	The multiple pathway potential carcinogenic risk and noncarcinogenic hazard for Site 57 Location III for the future residential land use scenario are 6E-04 and 4, respectively. Pathway 5 (groundwater ingestion) presents the greatest potential risk and hazard.

TABLE 9-3* (cont'd)

Summary of Baseline Risk Assessment for UMDA - Future Land Use Scenario

Site No.	Site Name	Contaminants of Concern	Exposure Assessment	Risk Characterization
57, cont'd	Former Pit Area Location III		Pathway 3 is complete and quantified for the future military land use scenario.	The potential carcinogenic risk and noncarcinogenic hazard for Site 57 Location III for the future military land use scenario (pathway 3, dust inhalation) are 2E-07 and 4E-05, respectively.
58	Borrow/Burn/Disposal Area	Soil: shallow (to a depth of 2 feet)--none detected; shallow and subsurface (to a depth of 10 feet)--none detected.	No complete pathways, because no contaminants of concern are detected.	No risks or hazards are calculated, because no complete exposure pathways are identified.
59	GB/VX Decontamination Solution Disposal Area	Groundwater: None detected. Soil: shallow (to a depth of 2 feet)--none detected; shallow and subsurface (to a depth of 10 feet)--none detected.	No complete pathways, because no contaminants of concern are detected.	No risks or hazards are calculated, because no complete exposure pathways are identified.
60	Active Firing Range	Soil: shallow (to a depth of 2 feet)--metals.	Pathways 2, 3, and 12 are complete and quantified for the future residential land use scenario.	A potential carcinogenic risk is not calculated for Site 60 because slope factors are not available for any of the contaminants of concern. The total potential noncarcinogenic hazard is 3E-01.
			Pathway 3 is complete and quantified for the future military land use scenario.	Potential carcinogenic risk and hazard are not calculated for the future military land use scenario (pathway 3, dust inhalation) because inhalation toxicity criteria are not available for any of the contaminants of concern.
OPERABLE UNIT C				
** 12	Inactive Landfill	Groundwater: metals, cyanide, and explosives. Soil: shallow (to a depth of 2 feet)--metals, semi-VOAs, and pesticides; shallow and subsurface (to a depth of 10 feet)--metals, nitrite/nitrate, semi-VOAs, pesticides, and PCBs.	Pathways 2, 3, 5, 7, and 12 are complete and quantified for the future residential land use scenario.	The multiple pathway potential carcinogenic risk and noncarcinogenic hazard for Site 12 for the future residential land use scenario are 1E-04 and 1, respectively. Pathway 5 (groundwater ingestion) presents the greatest potential risk.
** 50	Railroad Landfill Area	Groundwater: metals, cyanide, and explosives.	Pathways 5, 7, and 12 are complete and quantified for the future residential land use scenario.	The multiple pathway potential carcinogenic risk and noncarcinogenic hazard for Site 50 for the future residential land use scenario are 1E-04 and 8E-01, respectively. Pathway 5 (groundwater ingestion) presents the greatest potential risk.
82	Former Gravel Pit/ Disposal Location	Soil: Subsurface (to a depth of 10 feet)--none detected.	No complete pathways, because no contaminants of concern are detected.	No risks or hazards are calculated, because no complete exposure pathways are identified.
OPERABLE UNIT D				
9	Remote Munitions Dis-assesmbly/GB Bomb Disassembly Area	Soil: shallow (to a depth of 2 feet)--metals and explosives.	Pathways 1, 2, 3, and 12 are complete and quantified for the future residential land use scenario.	The multiple pathway potential carcinogenic risk and noncarcinogenic hazard for Site 9 for the future residential land use scenario are 4E-04 and 4, respectively. Pathway 12 (crop ingestion) presents the greatest potential risk and hazard.

TABLE 9-3* (cont'd)

Summary of Baseline Risk Assessment for UMDA - Future Land Use Scenario

Site No.	Site Name	Contaminants of Concern	Exposure Assessment	Risk Characterization
OPERABLE UNIT E				
1	Deactivation Furnace	Soil: shallow (to a depth of 2 feet)--metals; shallow and subsurface (to a depth of 10 feet)--metals.	Pathways 2, 3, and 12 are complete and quantified for the future residential land use scenario.	The multiple pathway potential carcinogenic risk and noncarcinogenic hazard for Site 1 for the future residential land use scenario are 2E-05 and 3, respectively. Pathways 2 (soil ingestion) and 12 (crop ingestion) present the greatest potential risk. Pathway 2 (soil ingestion) presents the greatest hazard.
3	Hazardous Waste Storage Facility	Groundwater: Not analyzed. Soil: Not analyzed.	No complete pathways because no media were analyzed.	No risks or hazards calculated because no complete exposure pathways are identified.
25	Metal Ore Piles Location I	Soil: shallow (to a depth of 2 feet)--metals.	Pathways 2, 3, and 12 are complete and quantified for the future residential land use scenario.	A potential carcinogenic risk is not calculated for Site 25 Location I because slope factors are not available for any of the contaminants of concern. The total potential noncarcinogenic hazard is 2. Pathway 2 (soil ingestion) presents the greatest potential hazard.
** 26	**Metal Ingot Stockpiles**	**Soil: shallow (to a depth of 2 feet)--metals.**	**Pathways 2, 3, and 12 are complete and quantified for the future residential land use scenario.**	**A potential carcinogenic risk is not calculated for Site 26 because slope factors are not available for any of the contaminants of concern. The total potential noncarcinogenic hazard is 4E-03.**
34	Paint Spray and Shot Blast Area	Soil: shallow (to a depth of 2 feet)--metals and semi-VOAs.	Pathways 2, 3, and 12 are complete and quantified for the future residential land use scenario.	The multiple pathway potential carcinogenic risk and noncarcinogenic hazard for Site 34 for the future residential land use scenario are 2E-07 and 6E-02, respectively.
35	Malathion Storage Leak Area	Soil: shallow (to a depth of 2 feet)--pesticides; shallow and subsurface (to a depth of 10 feet)--pesticides.	Pathways 2, 3, and 12 are complete and quantified for the future residential land use scenario.	The multiple pathway potential carcinogenic risk and noncarcinogenic hazard for Site 35 for the future residential land use scenario are 3E-07 and 2E-03, respectively.
37	Bldg 131-Paint Sludge Discharge Area	Soil: shallow (to a depth of 2 feet)--metals, VOAs, semi-VOAs.	Pathways 2, 3, and 12 are complete and quantified for the future residential land use scenario.	The multiple pathway potential carcinogenic risk and noncarcinogenic hazard for Site 37 for the future residential land use scenario are 1E-04 and 1, respectively. Pathway 12 (crop ingestion) presents the greatest potential risk and hazard.
44	Road Oil Application/ Disposal Sites--Location I	Soil: shallow (to a depth of 2 feet)--none detected.	No complete pathways, because no contaminants of concern are detected.	No risks or hazards calculated, because no complete exposure pathways are identified.
46	Railcar Unloading Area	Soil: shallow (to a depth of 2 feet)--metals and semi-VOAs.	Pathways 2, 3, and 12 are complete and quantified for the future residential land use scenario.	The multiple pathway potential carcinogenic risk and noncarcinogenic hazard for Site 46 for the future residential land use scenario are 3E-07 and 1E-01, respectively.

TABLE 9-3* (cont'd)

Summary of Baseline Risk Assessment for UMDA - Future Land Use Scenario

	Site No.	Site Name	Contaminants of Concern	Exposure Assessment	Risk Characterization
	80	Disposal Pit and Graded Area	Soil: subsurface (to a depth of 10 feet)--none detected.	No complete pathways, since no contaminants of concern are detected.	No risks or hazards calculated, since no complete exposure pathways are identified.
	81	Former Raw Materials Storage Location I	Soil: shallow (to a depth of 2 feet)--metals.	Pathways 2, 3, and 12 are complete and quantified for the future residential land use scenario.	A total potential carcinogenic risk was not calculated because slope factors are not available for any of the contaminants of concern in Site 81 soil. The multiple pathway potential noncarcinogenic hazard is 3E-05.
OPERABLE UNIT F					
	6	Sewage Treatment Plant	Soil: subsurface (to a depth of 10 feet)--none detected.	No complete pathways, since no contaminants of concern are detected.	No risks or hazards calculated, since no complete exposure pathways are identified.
**	30	Stormwater Discharge Area	Soil: shallow (to a depth of 2 feet)--metals and pesticides; shallow and subsurface (to a depth of 10 feet)--metals and pesticides.	Pathways 2, 3, and 12 are complete and quantified for the future residential land use scenario.	The multiple pathway potential carcinogenic risk and noncarcinogenic hazard for Site 30 for the future residential land use scenario are 1E-06 and 1E-02, respectively. Pathway 12 (crop ingestion) presents the greatest potential risk.
**	48	Pipe Discharge Area	Soil: shallow (to a depth of 2 feet)--metals, nitrite/nitrate, and pesticides; shallow and subsurface (to a depth of 10 feet)--metals, nitrite/nitrate, and pesticides.	Pathways 2, 3, and 12 are complete and quantified for the future residential land use scenario.	The multiple pathway potential carcinogenic risk and noncarcinogenic hazard for Site 48 for the future residential land use scenario are 2E-05 and 6E-01, respectively. Pathway 12 (crop ingestion) presents the greatest potential risk.
OPERABLE UNIT G					
**	11	Active Landfill	Groundwater: metals, cyanide, and explosives.	Pathways 5, 7, and 12 are complete and quantified for the future residential land use scenario.	The multiple pathway potential carcinogenic risk and noncarcinogenic hazard for Site 11 for the future residential land use scenario are 2E-04 and 2, respectively. Pathway 5 (groundwater ingestion) presents the greatest potential risk and hazard.
OPERABLE UNIT H					
**	22	DRMO Area	Soil: shallow (to a depth of 2 feet)--metals and pesticides; shallow and subsurface (to a depth of 10 feet)--metals and pesticides.	Pathways 2, 3, and 12 are complete and quantified for the future residential land use scenario.	The multiple pathway potential carcinogenic risk and noncarcinogenic hazard for Site 22 for the future residential land use scenario are 5E-07 and 1, respectively. Pathways 2(soil ingestion) and 12 (crop ingestion) present the greatest potential hazard.
	27	Pesticide Storage Building	Soil: shallow (to a depth of 2 feet)--metals, semi-VOAs, and pesticides.	Pathways 2, 3, and 12 are complete and quantified for the future residential land use scenario.	The multiple pathway potential carcinogenic risk and noncarcinogenic hazard for Site 27 for the future residential land use scenario are 3E-08 and 5E-03, respectively.

TABLE 9-3* (cont'd)

Summary of Baseline Risk Assessment for UMDA - Future Land Use Scenario

	Site No.	Site Name	Contaminants of Concern	Exposure Assessment	Risk Characterization
**	44	Road Oil Application/ Disposal Sites-- Location II	Soil: shallow (to a depth of 2 feet)--metals; shallow and subsurface (to a depth of 10 feet)--metals.	Pathways 2, 3, and 12 are complete and quantified for the future residential land use scenario.	A total potential carcinogenic risk is not calculated because slope factors are not available for any of the contaminants of concern in Site 44 soil. The multiple pathway potential noncarcinogenic hazard is 5E-04.
	OPERABLE UNIT I				
	10	Former Agent H Storage Area	Soil: shallow (to a depth of 2 feet)--metals; subsurface (to a depth of 10 feet)--metals.	Pathways 2, 3, and 12 are complete and quantified for the future residential land use scenario.	A multiple pathway potential carcinogenic risk is not calculated because a slope factors for antimony, the only contaminant of concern, is not available. The multiple pathway potential noncarcinogenic hazard is 6E-02.
	33	Gravel Pit Disposal Area	Soil: shallow (to a depth of 2 feet)--none detected; shallow and subsurface (to a depth of 10 feet)--none detected.	No complete pathways, because no contaminants of concern are detected.	No risks or hazards calculated because no complete exposure pathways are identified.
	49	Drill and Transfer Site	Soil: shallow (to a depth of 2 feet)--none detected.	No complete pathways because no contaminants of concern are detected.	No risks or hazards calculated because no complete exposure pathways are identified.
	OPERABLE UNIT J				
**	2	Storage Igloos (H1641 & H1642)	Soil: shallow (to a depth of 2 feet)--metals.	Pathways 2, 3, and 12 are complete and quantified for the future residential land use scenario.	The multiple pathway potential carcinogenic risk and noncarcinogenic hazard for Site 2 for the future residential land use scenario are 9E-07 and 3E-01, respectively.
	25	Metal Ore Piles Location II	Soil: shallow (to a depth of 2 feet)--metals.	Pathways 2, 3, and 12 are complete and quantified for the future residential land use scenario.	The multiple pathway potential carcinogenic risk and noncarcinogenic hazard for Site 25 Location II for the future residential land use scenario are 4E-09 and 1, respectively. Pathway 2 (soil ingestion) presents the greatest potential hazard.
	29	Septic Tanks 420, 417, 419, 486, 655-1, 655-2, 622	Soil: subsurface (to a depth of 10 feet)--metals, VOAs, semi-VOAs.	No complete pathways for the future residential land use scenario, because surface soil was not sampled.	No risks or hazards calculated because no complete exposure pathways are identified for the future residential land use scenario.
	39	QA Function Range	Soil: shallow (to a depth of 2 feet)--metals.	Pathways 2, 3, and 12 are complete and quantified for the future residential land use scenario.	A total potential carcinogenic risk is not calculated because slope factors are not available for any of the contaminants of concern in Site 39 soil. The multiple pathway potential noncarcinogenic hazard is 6E-02.
	45	Bldg 612-Boiler Discharge Area Location I	Soil: shallow (to a depth of 2 feet)--metals.	Pathways 2, 3, and 12 are complete and quantified for the future residential land use scenario.	The multiple pathway potential carcinogenic risk and noncarcinogenic hazard for Site 45 Location I for the future residential land use scenario are 1E-08 and 1E-01, respectively.

TABLE 9-3* (cont'd)

Summary of Baseline Risk Assessment for UMDA - Future Land Use Scenario

Site No.	Site Name	Contaminants of Concern	Exposure Assessment	Risk Characterization
45	Bldg 617-Boiler Discharge Area Location II	Soil: shallow (to a depth of 2 feet)--metals.	Pathways 2, 3, and 12 are complete and quantified for the future residential land use scenario.	The multiple pathway potential carcinogenic risk and noncarcinogenic hazard for Site 45 Location II for the future residential land use scenario are 2E-08 and 7E-02, respectively.
53	Bldg-433 Collection Sump/Cistern and Disposal Area	Soil: shallow (to a depth of 2 feet)--metals, and semi-VOAs.	Pathways 2, 3, and 12 are complete and quantified for the future residential land use scenario.	The multiple pathway potential carcinogenic risk and noncarcinogenic hazard for Site 53 for the future residential land use scenario are 7E-09 and 9E-02, respectively.
81	Former Raw Materials Storage Location II	Soil: surface (to a depth of 2 feet)--none detected.	No complete pathways because no contaminants of concern are detected.	No risks or hazards are calculated because no complete exposure pathways are identified.

*-Replaces original Table ES-5 in the Final Baseline RA; Dames & Moore, 1992a.
**-Site at which followup fieldwork was conducted.

TABLE 9-4*

Summary of Contaminants Which Significantly Contribute to Risk and Hazard Estimates for Baseline Risk Assessment Umatilla Army Depot Activity, Hermiston, Oregon (a)

Sites at Which Contaminant Significantly Contributed to Risks and/or Hazards via:

Contaminant	Pathway 1: Cancer	Pathway 1: Noncancer	Pathway 2: Cancer	Pathway 2: Noncancer	Pathway 3: Cancer	Pathway 3: Noncancer	Pathway 5: Cancer	Pathway 5: Noncancer
TAL Inorganics:								
Antimony				1, 15**, 19**, 32 II, 47**				8/31, 11**, 19**, 41
Arsenic			1, 13, 15**, 18**, 19**, 57 III		19**		4/47/67 (F), 8/31, 11**, 12, 13/57 II, 14/38, 15/55, 16, 18, 19**, 41, 50**, 57 I, 57 III	4/47/67 (F), 8/31, 11**, 13/57 II, 14/38, 15/55, 16, 18, 19**, 41, 57 I, 57 III
Barium				32 II				
Beryllium			1, 15**, 17**, 22**, 56				4/47/67 (F), 19**, 41	
Cadmium				15**, 36**, 47**	19**			
Chromium				15**	14 (c), 15**, 18**, 19**	14 (c), 15**, 18** (c), 19** (c)		
Cobalt				15**, 16, 17**, 36**				
Copper				1, 19**, 32 II				
Mercury								
Nickel								
Selenium								11**
Thallium				1, 15**, 25 I, 25 II				
Vanadium								8/31, 11**, 16, 41
Zinc				19**, 32 II				
Explosives:								
2,4-DNT	4, 15**, 32 I, 32 II		4, 32 I, 32 II				4/47/67 (F,B)	
2,6-DNT	13							
RDX			4, 5**, 15**				4/47/67 (F,B)	4/47/67 (F,B)
Tetryl								
1,3,5-TNB		4, 5**, 15**, 31		4, 19**, 31				4/47/67 (F,B)
2,4,6-TNT	4, 5**, 15**, 17**, 19**, 31	4, 5**, 15**, 19**, 31	4, 5**, 19**, 31	4, 5**, 19**, 31			4/47/67 (F)	4/47/67 (F,B)
Other Inorganics:								
Nitrite/nitrate								8/31
TCL Volatiles:								
Benzene								
Trichloroethylene								
TCL Semivolatiles:								
bis(2-Ethylhexyl)phthalate			37					
PAHs			12**, 47**					
Pesticides/PCBs:								
DDD			48**					
DDE			48**					
DDT			48**					
PCB 1260	47**		47**					

TABLE 9-4* (cont'd)

Summary of Contaminants Which Significantly Contribute to Risk and Hazard Estimates for Baseline Risk Assessment Umatilla Army Depot Activity, Hermiston, Oregon (a)

	Sites at Which Contaminant Significantly Contributed to Risks and/or Hazards via:					
	Pathway 6 (b):	Pathway 7 (b):	Pathway 11:		Pathway 12:	
Contaminant	Cancer	Cancer	Cancer	Noncancer	Cancer	Noncancer
TAL Inorganics:						
Antimony						
Arsenic					1, 13, 14, 16, 18**, 41, 57 I, 57 II, 57 III	
Barium						
Beryllium						
Cadmium					1, 22**, 56	
Chromium						15**, 36**, 37, 38, 47**
Cobalt						
Copper						
Mercury						
Nickel						13, 57 II
Selenium						18**
Thallium						
Vanadium						
Zinc						
Explosives:						
2,4-DNT		4/47/67 (F,B)			11**, 32 I, 32 II, 47**, 67	15**, 32 I, 32 II
2,6-DNT					11**, 13, 15**	13
RDX		4/47/67 (F,B)			4, 5**, 9, 16, 17**, 47**, 52, 67	4, 5**, 9, 15**, 16, 17**, 47**, 52, 67
Tetryl						13, 57 II
1,3,5-TNB						4, 5**, 15**, 19**, 31, 47**, 67
2,4,6-TNT		4/47/67 (F)	31	31	4, 5**, 16, 19**, 31, 38, 47**, 67	4, 5**, 15**, 16, 17**, 19**, 31, 38, 47**, 67
Other Inorganics:						
Nitrite/nitrate						
TCL Volatiles:						
Benzene	8/31					
Trichloroethylene	4/47/67 (F)					
TCL Semivolatiles:						
bis(2-Ethylhexyl)phthalate					37	37
PAHs					12**, 47**	
Pesticides/PCBs:						
DDD					30**, 48**	
DDE					30**, 48**	
DDT					30**, 48**	
PCB 1260					47**	

(a) - Contaminants, sites, and pathways are listed in this table only if risks and/or hazards exceeded 1E-06 or 1, respectively. Sites 2, 10, 21, 26, 27, 29, 34, 35, 39, 44II, 45 I, 45 II, 46, 53, 60, and 81 I were not included since both risks and hazards were less than 1E-06 and 1, respectively.

(b) - A noncancer column is not presented for Pathways 6 & 7 since no sites yielded hazard indices exceeding 1 for these pathways.

(c) - Only the military (tank training) land use scenario yielded risks exceeding 1E-06 or hazards exceeding 1, respectively, at this Operable Unit B site.

NOTE: The following sites were combined for the purposes of groundwater evaluation: 4/47/67, 8/31, 13/57 II, 14/38, 15/55. For Sites 4/47/67, F denotes the flood gravel aquifer and B denotes the basalt aquifer.

*-Replaces original Table 9-4 in the Final Baseline RA; Dames & Moore, 1992a.

** - Site at which followup fieldwork was conducted.

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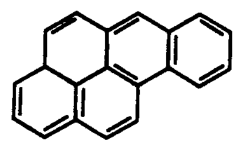
APPENDIX C*

Fate and Transport Characteristics of the Contaminants of Concern

C.2.3A Benzo[a]pyrene

C.2.3A.1 Background

Benzo[a]pyrene is a five ring polycyclic aromatic hydrocarbon. It occurs both naturally and from anthropogenic sources. Manmade sources include coal tar processing, petroleum refining, heat and power generation, and the combustion of tobacco and fossil fuels. Natural sources are various bacteria that synthesize benzo[a]pyrene. Synonyms include Bap, B(a)P, and 3,4-benzopyrene. Its structural formula is:



C.2.3A.2 Important Physical and Chemical Properties

Table C.2.3A-1 summarizes important physical and chemical properties of benzo[a]pyrene, including the chemical formula, the Chemical Abstract Service (CAS) registry number, and the USAEC abbreviation. Refer to Section C.1.2 of the Baseline RA for the estimation techniques used by Dames & Moore to calculate the diffusion coefficient in water.

C.2.3A.3 Important Environmental Fate and Transport Properties

C.2.3A.3.1 Chemical Degradation/Transformation

C.2.3A.3.1.1 Photolysis. PAHs are capable of photolyzing rapidly. Radding et al. (1976) report that PAHs absorb solar radiation strongly at wavelengths above the solar cutoff of 300 nanometers (nm), indicating rapid oxidation. Smith et al. (1977) report that photolysis of benzo[a]pyrene is rapid, with midday half-lives of approximately 1 hour. Smith also reports that photolytic products include three quinones and that rates of photolysis are slower in natural water and pure water containing humic acid than in pure water. These data indicate that photolysis may be an important environmental fate process for benzo[a]pyrene in certain environmental media;

TABLE C.2.3A-1

PHYSICAL AND CHEMICAL PROPERTIES OF BENZO[A]PYRENE

CAS Reg. No.: 50-32-8
Chemical Formula: $C_{20}H_{12}$

Class: TCL SVOA
USATHAMA Abbreviation: BAPYR

Molecular Weight (amu):	252.32	Vapor Pressure (mm Hg at 20°C):	5.0×10^{-7}(d)
Color:	yellow(a)	Henry's Law Constant (atm-m^3/mole):	$<2.4 \times 10^{-6}$(e)
Freezing/Melting Point (°C):	179(a)	Octanol-Water Partition Coefficient (log K_{ow}):	6.04(f)
Boiling Point (°C):	496(b)	Organic-Carbon Partition Coefficient (log K_{oc}):	6.74(g)
Physical State (at 20°C):	solid(a)	Bioconcentration Factor (log BCF):	5.15(g)
Solid Density at 25°C (g/cm^3):	1.351(c)	Diffusion Coefficient in Air (cm^2/s at 20°C):	**
Flash Point (°C):	*	Diffusion Coefficient in Water (cm^2/s at 20°C):	4.269×10^{-6}(@)
Solubility in Water (mg/l at 25°C):	0.003(a)		

@ = Dames & Moore calculation as per Section C.1.2
* = no data found during profile preparation
** = not relevant at normal environmental conditions
a = Verscheuren, 1983
b = Weast, 1977
c = Kronberger and Weiss, 1944
d = Sims et al., 1988
e = Southworth, 1979
f = Radding et al., 1976
g = Mabey et al., 1982

however, as discussed later, the octanol-water partition coefficients for benzo[a]pyrene are high and are readily adsorbed onto suspended particulate matter, which may lessen the role of photolysis as a fate process.

C.2.3A.3.1.2 Oxidation. The principal oxidizing species of polycyclic aromatic hydrocarbons are alkylperoxy (RO_2) radicals generated from the photolytic cleavages of trace carbonyl compounds or from enzymatic sources, and singlet oxygen. The rates of free radical oxidation by RO_2 vary among specific PAHs, but in general depend on the concentration of RO_2 radicals (Radding et al., 1976). The half-life for the reaction of RO_2 with benzo[a]pyrene is calculated to be 9,900 days by Radding et al. (1976). These data suggest that oxidation is not a significant fate process for benzo[a]pyrene. Several scientists have found that in the presence of chlorine or ozone, the oxidative half-life of benzo[a]pyrene decreases significantly. Data summarized by Radding et al. (1976) indicate that benzo[a]pyrene will have an initial 10-minute half-life when exposed to a 0.5-mg/L solution of chlorine in water (Trakhtman and Manita, 1966). Radding et al. (1976) calculate the half-life for benzo[a]pyrene oxidation by ozone in water to be approximately 1 minute. It appears that oxidation may become an important fate process when chlorine and ozone are present in sufficient quantity.

C.2.3A.3.1.3 Hydrolysis. Benzo[a]pyrene is not hydrolyzable (Mabey et al., 1982).

C.2.3A.3.1.4 Volatilization. Smith et al. (1978) determine the benzo[a]pyrene volatilization half-life to be 140 hours under the experimental conditions of rapid stirring. Southworth (1979) measures the volatilization rates for several PAHs with from two to five aromatic rings and finds that volatilization rates decrease with decreased vapor pressure, which is inversely proportional to the number of rings. Benzo[a]pyrene (with five rings) volatilizes very slowly. Volatilization also tends to be hindered by the likelihood that benzo[a]pyrene molecules are sorbed onto particulate matter. These data indicate that volatilization, when compared to other fate process, is not significant.

C.2.3A.3.1.5 Sorption. Sorption is one of the major fate processes of PAHs. This is supported by the relatively large octanol-water partition coefficients, low solubilities,

and moderate organic-carbon partition coefficients of PAHs. Smith et al. (1978) report that benzo[a]pyrene shows rapid partitioning onto suspended matter. Using a simulated river system, they estimate that 83 percent of benzo[a]pyrene will be sorbed onto suspended solids. In addition, they report that benzo[a]pyrene is strongly adsorbed onto bacterial cells as well as suspended abiotic matter. These data indicate that benzo[a]pyrene accumulates in sediments, suspended particulates, and biotic portions of the aquatic environment and that sorption is the dominant transport process.

C.2.3A.3.2 Biological Degradation/Uptake/Accumulation

C.2.3A.3.2.1 Biotransformation and Biodegradation. Biodegradation is one of the more important fate processes for PAHs. PAHs with less than four aromatic rings appear to undergo biodegradation more readily than those with four rings or more, and the rate of degradation is greater when the microbial population adjusts to the increased concentration of PAHs.

Herbes and Schwall (1978) report a half-life of 21,000 hours for benzo[a]pyrene at a petroleum-contaminated site, with degradation rates substantially slower in pristine sediments. Biodegradation is apparently more complete in microorganisms than in mammals, and metabolic products vary depending on the organism.

C.2.3A.3.2.2 Bioaccumulation. Bioaccumulation of PAHs is a rapid but short-term process because of the significant biodegradation processes discussed earlier. Reported bioconcentration factors for benzo[a]pyrene range from 12.5 to approximately 8.9 million depending on the organism and environment; however, in general, the bioconcentration factors for benzo[a]pyrene are greater than those for PAHs with lower molecular weights. Accumulation of benzo[a]pyrene has been reported in fish, snails, benthic organisms, plants, and many other organisms. The specific fate of bioaccumulated benzo[a]pyrene depends on the organism and the particular environment.

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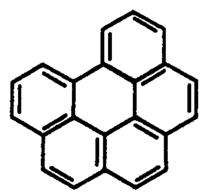
C.2.5A Benzo[ghi]perylene

C.2.5A.1 Background

Benzo[ghi]perylene is a polycyclic aromatic hydrocarbon with six aromatic rings. It is present in the environment from coal gasification processes, exhaust emissions, and other industrial processes. It has been detected in drinking water, groundwater, industrial effluents, and ambient river water. Synonyms include 1,12-benzoperylene and B(ghi)P. Its structural formula is:



Because of a lack of available data specific to benzo[ghi]perylene, the fate and transport processes are largely inferred from general studies of similar PAHs.

C.2.5A.2 Important Chemical and Physical Properties

Table C.2.5A-1 summarizes important physical and chemical properties of benzo[ghi]perylene, including the chemical formula, the CAS registry number, and the USAEC abbreviation. Refer to Section C.1.2 of the Baseline RA for the estimation techniques used by Dames & Moore to calculate the diffusion coefficient in water.

C.2.5A.3 Important Environmental Fate and Transport Properties

C.2.5A.3.1 Chemical Degradation/Transformation

C.2.5A.3.1.1 Photolysis. PAHs are capable of photolyzing rapidly. Radding et al. (1976) report that most PAHs absorb solar radiation strongly at wavelengths above the solar cutoff of 300 nm, which is indicative of rapid photooxidation. Zepp and Cline (1977) observe that photolysis is rapid for benzo(a)pyrene and benzo(a)anthracene, which have half-lives of 1.2 hours and 1 to 2 hours, respectively (Smith et al., 1978). When exposed to natural sunlight, anthracene dissolves in distilled water and

TABLE C.2.5A-1

PHYSICAL AND CHEMICAL PROPERTIES OF BENZO[ghi]PERYLENE

CAS Reg. No.: 191-24-2
Chemical Formula: $C_{22}H_{12}$

Class: TCL SVOA
USATHAMA Abbreviation: BGHIPY

Molecular Weight (amu):	276.34	Vapor Pressure (mm Hg at 25°C):	1.01×10^{-10}(d)
Color:	*	Henry's Law Constant (atm-m^3/mole):	1.4×10^{-7}(c)
Freezing/Melting Point (°C):	222(a)	Octanol-Water Partition Coefficient (log K_{ow}):	7.10(e)
Boiling Point (°C):	525(b)	Organic-Carbon Partition Coefficient (log K_{oc}):	6.20(a)
Physical State (at 20°C):	solid(c)	Bioconcentration Factor (log BCF):	5.54(a)
Solid Density at 25°C (g/cm^3):	*	Diffusion Coefficient in Air (cm^2/s at 20°C):	**
Flash Point (°C):	*	Diffusion Coefficient in Water (cm^2/s at 20°C):	4.065×10^{-6}(@)
Solubility in Water (mg/l at 25°C):	0.00026(a)		

@ = Dames & Moore calculation as per Section C.1.2
* = no data found during profile preparation
** = not relevant at normal environmental conditions
a = Mabey et al., 1982
b = Pearlman et al., 1984
c = Montgomery and Welkom, 1990
d = Radding et al., 1976
e = Mackay et al., 1980

degrades, with a photolytic half-life of about 35 minutes (Southworth, 1977). Atmospheric half-lives are generally less than 30 days (USPHS, 1989).

PAHs absorbed to soot are reportedly more resistant to photochemical reactions than pure compounds (NRC, 1983). In studying the photolysis rates of PAHs sorbed to soot particles and exposed to sunlight, Butler and Crossley (1981) report the following half-lives--benzo(a)pyrene, 7 days; benzo(g,h,i)perylene, 8 days; benz(a)anthracene, 11 days; benzo(f)fluoranthene, 14 days; chrysene, 26 days; fluoranthene, 27 days; and phenanthrene, 30 days.

In contrast, Nagata and Kondo (1977) report that benzo(a)pyrene, chrysene, fluorene, and benzo(f)fluoranthene are resistant to photodegradation. In addition, Lee and Anderson (1977) report that naphthalene does not undergo photolysis in a controlled ecosystem.

In photolysis of PAHs, the major oxidant is singlet oxygen. The reaction products include peroxides, quinones, phenols, nitrated PAHs, and dihydrodiols (NAS, 1972; Stevens and Algar, 1968; Kamens et al., 1986; Holloway et al., 1987). Reactions with ozone or peroxyacetylnitrate yield dienes, nitrogen oxide reactions yield nitro and dinitro PAHs, and sulfur dioxide reactions yield sulfuric acids.

C.2.5A.3.1.2 Oxidation. Callahan et al. (1979) report that the major oxidizing agents of PAHs in solution are singlet oxygen (discussed above), alkylperoxy (RO_2), and hydroperoxy (HO_2). The rates of free radical oxidation by RO_2 vary among PAHs (Mahoney, 1965). Half-lives of 1,600, 9,000, and 1,600 days are reported for anthracene, benzo(a)pyrene, and perylene, respectively (Radding et al., 1976).

Chlorine and ozone, when used in disinfecting water, are also significant oxidizing species. In Perry and Harrison's (1977) study of the effects of chlorination on various PAHs in water, only 25 percent of fluorene is degraded after 25 minutes, whereas 50 percent of benzo(f)fluoranthene is degraded after 20 minutes. Decreased pH and increased temperature accelerate the rates of degradation. Based on observations of Trakhtman and Manita (1966) and Il'nitskii et al. (1968), Radding et al. (1976) estimate a half-life of 10 minutes for benzo(a)pyrene when exposed to a

0.5-mg/L solution of chlorine in water, and 1 minute for benzo(f)fluoranthene, benzo(a)pyrene, and benzo(a)anthracene when exposed to ozone in water. Harrison et al. (1976a; 1976b) also study the efficiencies of chlorination and ozonation on PAHs. Benzo(a)anthracene, benzo(a)pyrene, perylene, and, especially, benzo(f)fluoranthene are highly degraded. Indeno(1,2,3-cd) benzo(f)fluoranthene and benzo(g,h,i)pyrene are intermediate in relative degradation. Benzo(k)fluoranthene and fluoranthene degrade quite slowly.

C.2.5A.3.1.3 Hydrolysis. Hydrolysis is not considered to be a significant fate mechanism for PAHs (Radding et al., 1976).

C.2.5A.3.1.4 Volatilization. The molecular weight and number of rings of a compound play a significant role in determining its volatilization rate. PAHs with high molecular weights, such as benzo(b)fluoranthene, have comparatively low Henry's Law constants (10^{-5} to 10^{-8}) and, hence, a very low tendency to volatilize (Lyman et al., 1982). Although no studies were found regarding medium molecular weight PAHs, volatilization rates for these compounds can be inferred from studies of high and low molecular weight PAHs. Southworth (1979) estimates a volatilization of half-life for anthracene (a low molecular weight compound) of 18 hours in a moderate current and wind. In contrast, Smith et al. (1978) calculate volatilization half-lives of 22 and 89 hours for benzo(a)pyrene and benzo(a)anthracene, respectively, in a rapidly stirred aqueous solution.

In a model stream study, Southworth (1979) notes an inverse relationship between the number of aromatic rings (four or more) and both the volatilization rates of PAHs and the effect of mixing on volatilization rates. For example, following a tenfold increase in stream flow velocity, the volatilization half-life for naphthalene (two rings) increases 7.5 times, compared to 1.4 times for benzo(a)pyrene (four rings). Southworth concludes that volatilization is insignificant for PAHs with four or more rings.

C.2.5A.3.1.5 Sorption. Sorption is one of the major fate processes of PAHs. This is supported by the relatively large log octanol-water partition coefficients, low

solubilities, and moderate organic-carbon partition coefficients (K_{oc}) of PAHs. For example, Smith et al. (1978) report that benzo(a)pyrene and benzo(a)anthracene show rapid partitioning onto suspended matter. In an enclosed marine ecosystem study, less than 1 percent of the original concentration of benzo(a)anthracene remains in the water column after 30 days; losses are attributed to adsorption to settling particles and, to a lesser extent, to photodegradation (Hinga and Pilson, 1987). Based on a model river system, Smith et al. (1978) estimate 83 percent and 71 percent absorption rates of benzo(a)pyrene and benzo(a)anthracene, respectively. In similar experiments, Southworth (1977) observes partition coefficients (solids/water) for anthracene of approximately 25,000 and 1,600 in suspended organic particulates and in inorganic sediments, respectively. Sullivan and Mix (1985) report a direct correlation between molecular weight and K_{oc} values. They also note that PAHs move into soil by partitioning and leaching to organic substances. Benzo(f)fluoranthene, evidencing the impact of organic content absorption of PAHs, has the following partition coefficients--sand, 9.4 to 68; silt, 1,500 to 3,600; and clay, 1,400 to 3,800 (Karickhoff et al., 1979). About twice as much fluoranthene, benzo(a)anthracene, and benzo(a)pyrene are retained by marsh sediment as by sand (Gardner et al., 1979).

C.2.5A.3.2 Biological Degradation/Uptake/Accumulation

C.2.5A.3.2.1 Biotransformation and Biodegradation. The importance of biodegradation as a transport mechanism for PAHs in soil increases for PAHs with less than four aromatic rings. The microbial degradation pathways are not completely understood.

Soil Pseudomonads is reportedly capable of metabolizing phenanthrene to 1,2-dihydronaphthalene (Evans et al., 1965). Soil microbes have been observed to degrade 3,4-benzopyrene, anthracene, and phenanthrene (Fedoseeva et al., 1968; Lorbacher et al., 1971; Shabad, 1968). The rate of degradation is greatest when the microbial population has an opportunity to adapt to the PAHs.

Herbes and Schwall (1978) report the following half-lives in petroleum-polluted sites--5 hours for naphthalene, 280 hours for anthracene, 7,000 hours for

benzo(a)anthracene, and 21,000 hours for benzo(a)pyrene. Degradation rates are 10 to 400 times slower in pristine sediment. Bacteria degrade PAHs to cis-dihydrodiols, whereas fungi and mammalians produce trans-dihydrodiols (Sims and Overcash, 1983). The initial reaction products are further degraded to acetic fumaric, pyruvic, and succinic acids, and acetylaldehyde.

Herbes and Schwall (1978) also observe a direct relationship between the number of rings and the rate of metabolism. This is supported by studies by Gardner et al. (1979), which find that anthracene and fluoranthene (two rings) degrade at a slightly faster rate than benzo(a)anthracene or benzo(a)pyrene (four rings). Each of the four compounds degrades between 0.84 and 3 percent of the mass per week.

The degree of contamination can also influence the rate of degradation. For example, the rate for benzo(a)pyrene is reduced by 71 percent in soil moderately contaminated with oil and 52 percent in soil highly contaminated with oil.

In aquatic systems, biodegradation is also a primary fate mechanism, though transformation often occurs at a much slower rate. Southworth (1977) reports a half-life for anthracene of 11.3 hours in a water solution. Naphthalene (two rings) biodegrades at the rate of 4 $\mu g/L^{-1}/day^{-1}$ in Skidaway River water (Lee and Ryan, 1976) and 0.04 to 3.3 $\mu g/L^{-1}$ day^{-1} at a depth of 5 to 10 meters (Lee and Anderson, 1977). Naphthalene has an observed half-life of 1 day (Vennberg, 1977; Lee and Anderson, 1977).

Algae are found to degrade benzo(a)pyrene to oxides, peroxides, and dihydrodiols (Kirso et al., 1983; Warshawsky et al., 1983). Benzo(f)fluoranthene and acenaphthylene in groundwater samples are completely biodegraded in 3 days (Ogawa et al., 1982). In addition, the fungus Cunninghamella elegans is reported to be capable of metabolizing naphthalene (Cerniglia and Gibson, 1979).

Varanasi et al. (1985) rank the amount of benzo(a)pyrene metabolism by aquatic organisms as follows--fish > shrimp > amphipod crustaceans > clams. Half-lives for total degradation of benzo(a)pyrene by fish are 2 to 9 days (Niimi, 1987). Mollusks eliminate the following percentages of accumulated compounds within 7

days--benzo(a)pyrene, 0 percent; benzo(a)anthracene, 32 percent; fluoranthene, 66 percent; and anthracene, 79 percent.

C.2.5A.3.2.2 Bioaccumulation. Bioaccumulation of PAHs is a rapid, but short-term, process because of the significant biodegradation processes (see Section C.2.5A.3.2.1). Bioconcentration factors of PAHs generally are between 100 and 200. In general, bioconcentration is greater for higher molecular weight compounds than for lower molecular weight compounds. Spacie et al. (1983) estimate bioconcentration factors of 900 for anthracene and 4,900 for benzo(a)pyrene in bluegills.

In studying the bioaccumulation potential of several PAHs in Daphnia pulex, Southworth (1977) observes that the concentration factors increase dramatically with increasing molecular weight, ranging from 100 for naphthalene to 10,000 for benzo(a)anthracene. Naphthalene, anthracene, and benzo(a)anthracene reach equilibrium within 2, 6, and 24 hours, respectively. Gile et al. (1982) find that after 3 weeks of exposure, gray-tailed voles accumulate phenanthrene and benzo(f)fluoranthene at ratios (vole:soil) of 12 and 13, respectively. In the same experiment, snail, pill bug, and earthworm concentration ratios are 5.45, 2.87, and 30.5, respectively.

Benzo(a)pyrene and benzo(a)anthracene sorb rapidly onto bacterial cells with a partition coefficient (cell/water) of approximately 104 (Smith et al., 1978). 3,4-Benzopyrene and perylene are observed to accumulate in lagoon biota, particularly the top levels of the food chain (Niaussat and Auger, 1970). 3,4-Benzopyrene also accumulates in freshwater worms (Scaccini-Cicatelli, 1966).

Studies by Roubal et al. (1977) indicate that PAHs are accumulated in the order anthracene > naphthalene > benzene, which correlates with the number of benzoid rings and the octanol-water partition coefficients. Lee et al. (1972) observe that mussels accumulate 10 percent of an initial dosage of naphthalene in 4 hours. Anderson (1974) notes that after 4 hours of exposure to 1 μg/L of naphthalene, sheepshead minnows have tissue levels of 60 ppm.

To a limited extent, PAHs taken from the diet contribute to accumulation in tissues. For example, 15 percent of the concentration of anthracene in flathead minnows comes from consuming water fleas (Southworth, 1979).

PAHs in sediments are found to accumulate in benthic organisms. For example, in an estuarine environment, amphipods, clams, and fish and shrimp accumulate PAHs at the following ratios to sediment concentrations--0.6 to 1.2, 0.1, and 0.05, respectively (Varanasi et al., 1985).

Terrestrial plants are reported to take up PAHs through their roots or foliage (Edwards, 1983). Ratios of vegetation to soil PAH concentrations range from 0.001 to 0.18. Atmospheric PAHs, which generally have a greater tendency to sorb into plants than PAHs in soil, are found to deposit between 30 and 70 percent of their PAH concentrations onto leaves.

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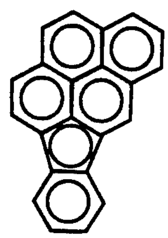
C.2.20A Indeno[1,2,3-cd]pyrene

C.2.20A.1 Background

Indeno[1,2,3-cd]pyrene is a PAH with five benzoid rings. It is present in the environment from coal gasification processes, exhaust emissions, and other industrial processes, and has been detected in drinking water and ambient river water. Synonyms include 2,3-0-phenylenepyrene and IP, and its structural formula is:



Because of a lack of available data specific to indeno[1,2,3-cd]pyrene, the fate and transport processes are largely inferred from general studies of similar PAHs.

C.2.20A.2 Important Chemical and Physical Properties

Table C.2.20A-1 summarizes important physical and chemical properties of indeno[1,2,3-cy]pyrene, including the chemical formula, the CAS registry number, and the USAEC abbreviation. Refer to Section C.1.2 of the Baseline RA for the estimation techniques used by Dames & Moore to calculate the log bioconcentration factor and the diffusion coefficient in water.

C.2.20A.3 Important Environmental Fate and Transport Properties

C.2.20A.3.1 Chemical Degradation/Transformation

C.2.20A.3.1.1 Photolysis. PAHs are capable of photolyzing rapidly. Radding et al. (1976) report that most PAHs absorb solar radiation strongly at wavelengths above the solar cutoff of 300 nm, which is indicative of rapid photooxidation. Zepp and Cline (1977) observe that photolysis is rapid for benzo(a)pyrene and benzo(a)anthracene, which have half-lives of 1.2 hours and 1 to 2 hours, respectively (Smith et al., 1978). When exposed to natural sunlight, anthracene dissolves in distilled water and

TABLE C.2.20A-1

PHYSICAL AND CHEMICAL PROPERTIES OF INDENO[1,2,3-cd]PYRENE

CAS Reg. No.: 193-39-5
Chemical Formula: $C_{22}H_{12}$

Class: TCL SVOA
USATHAMA Abbreviation: ICDPYR

Molecular Weight (amu):	276.34	Vapor Pressure (mm Hg at 25°C):	10^{-10}(c)
Color:	*	Henry's Law Constant (atm-m^3/mole):	$2.96x10^{-20}$(d)
Freezing/Melting Point (°C):	160-163(a)	Octanol-Water Partition Coefficient (log K_{ow}):	5.97(b)
Boiling Point (°C):	536(a)	Organic-Carbon Partition Coefficient (log K_{oc}):	7.49(e)
Physical State (at 20°C):	solid(a)	Bioconcentration Factor (log BCF):	4.31(@)
Solid Density at 25°C (g/cm^3):	*	Diffusion Coefficient in Air (cm^2/s at 20°C):	**
Flash Point (°C):	*	Diffusion Coefficient in Water (cm^2/s at 20°C):	$4.79x10^{-6}$(@)
Solubility in Water (mg/l at 25°C):	0.062(b)		

@ = Dames & Moore calculation as per Section C.1.2
* = no data found during profile preparation
** = not relevant at normal environmental conditions
a = Verscheuren, 1983
b = Sims et al., 1988
c = Office of Research and Development, 1980
d = Montgomery and Welkom, 1990
e = Karickhoff et al., 1979

degrades, with a photolytic half-life of about 35 minutes (Southworth, 1977). Atmospheric half-lives are generally less than 30 days (USPHS, 1989).

PAHs absorbed to soot are reportedly more resistant to photochemical reactions than pure compounds (NRC, 1983). In studying the photolysis rates of PAHs sorbed to soot particles and exposed to sunlight, Butler and Crossley (1981) report the following half-lives--benzo(a)pyrene, 7 days; benzo(g,h,i)perylene, 8 days; benz(a)anthracene, 11 days; benzo(f)fluoranthene, 14 days; chrysene, 26 days; fluoranthene, 27 days; and phenanthrene, 30 days.

In contrast, Nagata and Kondo (1977) report that benzo(a)pyrene, chrysene, fluorene, and benzo(f)fluoranthene are resistant to photodegradation. In addition, Lee and Anderson (1977) report that naphthalene does not undergo photolysis in a controlled ecosystem.

In photolysis of PAHs, the major oxidant is singlet oxygen. The reaction products include peroxides, quinones, phenols, nitrated PAHs, and dihydrodiols (NAS, 1972; Stevens and Algar, 1968; Kamens et al., 1986; Holloway et al., 1987). Reactions with ozone or peroxyacetylnitrate yield dienes, nitrogen oxide reactions yield nitro and dinitro PAHs, and sulfur dioxide reactions yield sulfuric acids.

C.2.20A.3.1.2 Oxidation. Callahan et al. (1979) report that the major oxidizing agents of PAHs in solution are singlet oxygen (discussed above), alkylperoxy (RO_2), and hydroperoxy (HO_2). The rates of free radical oxidation by RO_2 vary among PAHs (Mahoney, 1965). Half-lives of 1,600, 9,000, and 1,600 days are reported for anthracene, benzo(a)pyrene, and perylene, respectively (Radding et al., 1976).

Chlorine and ozone, when used in disinfecting water, are also significant oxidizing species. Perry and Harrison (1977) study the effects of chlorination on various PAHs in water. Only 25 percent of fluorene is degraded after 25 minutes, whereas 50 percent of benzo(f)fluoranthene is degraded after 20 minutes. Decreased pH and increased temperature accelerate the rates of degradation. Based on observation of Trakhtman and Manita (1966) and Il'nitskii et al. (1968), Radding et al. (1976) estimate a half-life of 10 minutes for benzo(a)pyrene when exposed to a

0.5-mg/L solution of chlorine in water, and 1 minute for benzo(f)fluoranthene, benzo(a)pyrene, and benzo(a)anthracene when exposed to ozone in water. Harrison et al. (1976a; 1976b) also study the efficiencies of chlorination and ozonation on PAHs. Benzo(a)anthracene, benzo(a)pyrene, perylene, and, especially, benzo(f)fluoranthene are highly degraded. Indeno(1,2,3-cd) benzo(f)fluoranthene and benzo(g,h,i)pyrene are intermediate in relative degradation. Benzo(k)fluoranthene and fluoranthene degrade quite slowly.

C.2.20A.3.1.3 Hydrolysis. Hydrolysis is not considered to be a significant fate mechanism for PAHs (Radding et al., 1976).

C.2.20A.3.1.4 Volatilization. The molecular weight and number of rings of a compound play a significant role in determining its volatilization rate. PAHs with high molecular weights, such as benzo(b)fluoranthene, have comparatively low Henry's Law constants (10^{-5} to 10^{-8}) and, hence, a very low tendency to volatilize (Lyman et al., 1982). Although no studies were found regarding medium molecular weight PAHs, volatilization rates for these compounds can be inferred from studies of high and low molecular weight PAHs. Southworth (1979) estimates a volatilization of half-life for anthracene (a low molecular weight compound) of 18 hours in a moderate current and wind. In contrast, Smith et al. (1978) calculate volatilization half-lives of 22 and 89 hours for benzo(a)pyrene and benzo(a)anthracene, respectively, in a rapidly stirred aqueous solution.

In a model stream study, Southworth (1979) notes an inverse relationship between the number of aromatic rings (four or more) and both the volatilization rates of PAHs and the effect of mixing on volatilization rates. For example, following a tenfold increase in stream flow velocity, the volatilization half-life for naphthalene (two rings) increases 7.5 times, compared to 1.4 times for benzo(a)pyrene (four rings). Southworth concludes that volatilization is insignificant for PAHs with four or more rings.

C.2.20A.3.1.5 Sorption. Sorption is one of the major fate processes of PAHs. This is supported by the relatively large log octanol-water partition coefficients, low

solubilities, and moderate organic-carbon partition coefficients (K_{oc}) of PAHs. For example, Smith et al. (1978) report that benzo(a)pyrene and benzo(a)anthracene show rapid partitioning onto suspended matter. In an enclosed marine ecosystem study, less than 1 percent of the original concentration of benzo(a)anthracene remains in the water column after 30 days; losses are attributed to adsorption to settling particles and, to a lesser extent, to photodegradation (Hinga and Pilson, 1987). Based on a model river system, Smith et al. (1978) estimate 83 percent and 71 percent absorption rates of benzo(a)pyrene and benzo(a)anthracene, respectively. In similar experiments, Southworth (1977) observe partition coefficients (solids/water) for anthracene of approximately 25,000 and 1,600 in suspended organic particulates and in inorganic sediments, respectively. Sullivan and Mix (1985) report a direct correlation between molecular weight and K_{oc} values. They also noted that PAHs move into soil by partitioning and leaching to organic substances. Benzo(f)fluoranthene, evidencing the impact of organic content absorption of PAHs, has the following partition coefficients--sand, 9.4 to 68; silt, 1,500 to 3,600; and clay, 1,400 to 3,800 (Karickhoff et al., 1979). About twice as much fluoranthene, benzo(a)anthracene, and benzo(a)pyrene are retained by marsh sediment as by sand (Gardner et al., 1979).

C.2.20A.3.2 Biological Degradation/Uptake/Accumulation

C.2.20A.3.2.1 Biotransformation and Biodegradation. The importance of biodegradation as a transport mechanism for PAHs in soil increases for PAHs with less than four aromatic rings. The microbial degradation pathways are not completely understood.

Soil Pseudomonads is reportedly capable of metabolizing phenanthrene to 1,2-dihydronaphthalene (Evans et al., 1965). Soil microbes have been observed to degrade 3,4-benzopyrene, anthracene, and phenanthrene (Fedoseeva et al., 1968; Lorbacher et al., 1971; Shabad, 1968). The rate of degradation is greatest when the microbial population has an opportunity to adapt to the PAHs.

Herbes and Schwall (1978) report the following half-lives in petroleum-polluted sites--5 hours for naphthalene, 280 hours for anthracene, 7,000 hours for

benzo(a)anthracene, and 21,000 hours for benzo(a)pyrene. Degradation rates are 10 to 400 times slower in pristine sediment. Bacteria degrade PAHs to cis-dihydrodiols, whereas fungi and mammalians produce trans-dihydrodiols (Sims and Overcash, 1983). The initial reaction products are further degraded to acetic fumaric, pyruvic, and succinic acids, and acetylaldehyde.

Herbes and Schwall (1978) also observe a direct relationship between the number of rings and the rate of metabolism. This is supported by studies by Gardner et al. (1979), which find that anthracene and fluoranthene (two rings) degrade at a slightly faster rate than benzo(a)anthracene or benzo(a)pyrene (four rings). Each of the four compounds degrades between 0.84 and 3 percent of the mass per week.

The degree of contamination can also influence the rate of degradation. For example, the rate for benzo(a)pyrene is reduced by 71 percent in soil moderately contaminated with oil and 52 percent in soil highly contaminated with oil.

In aquatic systems, biodegradation is also a primary fate mechanism, though transformation often occurs at a much slower rate. Southworth (1977) reports a half-life for anthracene of 11.3 hours in a water solution. Naphthalene (two rings) biodegrades at the rate of 4 $\mu g/L^{-1}/day^{-1}$ in Skidaway River water (Lee and Ryan, 1976) and 0.04 to 3.3 $\mu g/L^{-1}$ day^{-1} at a depth of 5 to 10 meters (Lee and Anderson, 1977). Naphthalene has an observed half-life of 1 day (Vennberg, 1977; Lee and Anderson, 1977).

Algae are found to degrade benzo(a)pyrene to oxides, peroxides, and dihydrodiols (Kirso et al., 1983; Warshawsky et al., 1983). Benzo(f)fluoranthene and acenaphthylene in groundwater samples are completely biodegraded in 3 days (Ogawa et al., 1982). In addition, the fungus Cunninghamella elegans is reported to be capable of metabolizing naphthalene (Cerniglia and Gibson, 1979).

Varanasi et al. (1985) rank the amount of benzo(a)pyrene metabolism by aquatic organisms as follows--fish > shrimp > amphipod crustaceans > clams. Half-lives for total degradation of benzo(a)pyrene by fish are 2 to 9 days (Niimi, 1987). Mollusks eliminate the following percentages of accumulated compounds within 7

days--benzo(a)pyrene, 0 percent; benzo(a)anthracene, 32 percent; fluoranthene, 66 percent; and anthracene, 79 percent.

C.2.20A.3.2.2 Bioaccumulation. Bioaccumulation of PAHs is a rapid, but short-term, process because of the significant biodegradation processes (see Section C.2.20A.3.2.1). Bioconcentration factors of PAHs generally are between 100 and 200. In general, bioconcentration is greater for higher molecular weight compounds than for lower molecular weight compounds. Spacie et al. (1983) estimate bioconcentration factors of 900 for anthracene and 4,900 for benzo(a)pyrene in bluegills.

In studying the bioaccumulation potential of several PAHs in Daphnia pulex, Southworth (1977) observes that the concentration factors increase dramatically with increasing molecular weight, ranging from 100 for naphthalene to 10,000 for benzo(a)anthracene. Naphthalene, anthracene, and benzo(a)anthracene reach equilibrium within 2, 6, and 24 hours, respectively. Gile et al. (1982) find that after 3 weeks of exposure, gray-tailed voles accumulate phenanthrene and benzo(f)fluoranthene at ratios (vole:soil) of 12 and 13, respectively. In the same experiment, snail, pill bug, and earthworm concentration ratios were 5.45, 2.87, and 30.5, respectively.

Benzo(a)pyrene and benzo(a)anthracene sorb rapidly onto bacterial cells with a partition coefficient (cell/water) of approximately 104 (Smith et al., 1978). 3,4-Benzopyrene and perylene are observed to accumulate in lagoon biota, particularly the top levels of the food chain (Niaussat and Auger, 1970). 3,4-Benzopyrene also accumulates in freshwater worms (Scaccini-Cicatelli, 1966).

Studies by Roubal et al. (1977) indicate that PAHs are accumulated in the order anthracene > naphthalene > benzene, which correlates with the number of benzoid rings and the octanol-water partition coefficients. Lee et al. (1972) observe that mussels accumulate 10 percent of an initial dosage of naphthalene in 4 hours. Anderson (1974) notes that after 4 hours of exposure to 1 μg/L of naphthalene, sheepshead minnows have tissue levels of 60 ppm.

To a limited extent, PAHs taken from the diet contribute to accumulation in tissues. For example, 15 percent of the concentration of anthracene in flathead minnows comes from their consumption of water fleas (Southworth, 1979).

PAHs in sediment are found to accumulate in benthic organisms. For example, in an estuarine environment, amphipods, clams, and fish and shrimp accumulate PAHs at the following ratios to sediment concentrations--0.6 to 1.2, 0.1, and 0.05, respectively (Varanasi et al., 1985).

Terrestrial plants are reported to take up PAHs through their roots or foliage (Edwards, 1983). Ratios of vegetation to soil PAH concentrations range from 0.001 to 0.18. Atmospheric PAHs, which generally have a greater tendency to sorb into plants than PAHs in soil, are found to deposit between 30 and 70 percent of their PAH concentrations onto leaves.

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*Some information for this fate and transport profile came from a USPHS draft toxicological profile that states on every page "do not cite or quote." Experience has shown that the final version contains few modifications; therefore, we have chosen to use the draft information.

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APPENDIX E*

UMDA Air Modeling for Fugitive Dust

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UMDA Air Modeling for Fugitive Dust

E.1* INTRODUCTION

The inhalation of contaminated fugitive dust is considered a possible exposure pathway in this addendum to the Baseline RA. The exposure of various receptors can be evaluated by characterizing near-surface soil contamination, the emission rate for fugitive dust from contaminated sites, and dispersion characteristics of the emitted fugitive dust to obtain an annual average site-derived dust concentration available for inhalation by specific receptors. The emission rate and dispersion calculations are presented in Appendix E of the Baseline RA; near-surface soil contamination for the followup fieldwork sites is discussed in Section 3.0*.

Different emission rates are considered for the various land use scenarios. For the followup fieldwork sites, current land use is basically restricted to ammunition storage activities, with minimal soil disturbance. Future potential land use scenarios that may involve inhalation of dust include residential, agricultural, construction, industrial, and military. Although the emission rate is a critical component of the dust concentration calculation, it is usually derived from empirical observations. Three EPA documents (Cowherd et al., 1989; USEPA, 1988; Cowherd et al., 1988) are reviewed to identify applicable emission rate estimation algorithms. Resulting emission rate estimates are evaluated by comparing them to known maximum soil erosion values for Umatilla and Morrow Counties and dust concentrations.

The estimated emission rates are input into the Industrial Source Code-Short Term (ISCST) dispersion model (version 3.4; USEPA, 1990), which is used to estimate the site-derived dust concentrations in air from the various sites with contaminated surface soil. As a further evaluation of the reliability of the estimated emission rates, dust concentrations predicted by ISCST (based on input emission rates) are compared to dust concentrations measurements reported for high-volume particulate samplers

proximate to UMDA. The ISCST model results are adjusted, as appropriate, to yield predicted dust concentrations comparable to measured dust concentrations.

E.2* EMISSION RATES

For the followup fieldwork sites, open area wind erosion (OAWE) emission rates are used for current military and future residential land use.

E.2.1* Open Area Wind Erosion

The rationale for the selection of the OAWE emission rate calculation (Cowherd et al., 1988) is the same as that described in Section E.2.1 of the Baseline RA. The equations used to calculate the emission rate of wind-generated particulates, the variables used in these equations, the calculated emission rates for the OAWE, and the uncertainties related to the OAWE calculation are the same as those presented in Section E.2.1 of the Baseline RA.

The variables and calculated emission rates for the OAWE are contained in Table E-1 in the Baseline RA. Emission rates are calculated for the five upper bound wind speed scalars to which the ISCST defaults. The sixth wind speed scalar--35 mph--is selected because it is consistent with the average maximum fastest miles recorded at Pendleton, Oregon.

E.3* DISPERSION MODELING

The ISCST (version 3.4; USEPA, 1990), an extended version of the Single Source Model (CRSTER; USEPA,1977), is used with 5 years of sequential hourly meteorological data to calculate annual average fugitive dust concentrations. Two separate runs are required to model fugitive dust concentrations for each scenario because of model limitations on the number of source areas that can simultaneously be considered.

Input data and program control parameters are provided to the application, as either default or site-specific values, for seven major categories:

- Application title.

- "ISW" array, which contains most of the program's control or specification parameters.
- Receptor information.
- Source group data.
- Meteorological-related constants.
- Source data parameters.
- Hourly meteorological data.

Because all hourly meteorological data are read from logical unit IMET in a preprocessed format, these cards are not included.

Building wake effects could have been included as an eighth category of site-specific input values; however, they are omitted from the calculations, because almost all of the sites (sources) are ground level sources located at some distance from buildings (hundreds of meters to kilometers). Building wake effects are not expected to significantly affect calculated dust concentrations. In addition, this model application is already fairly complex, with numerous sites and receptors--44 sites, which were subdivided into 507 distinct sources for modeling, and 11 receptors for current exposure pathways and 44 receptors for future exposure pathways. Inclusion of the approximately 1,300 buildings located within the facility would have significantly increased the complexity of model input, significantly increased the modeling effort, and produced results of insignificant incremental value.

The input data requirements for the ISCST model computer program include meteorological, source, and receptor data. The meteorological data inputs used in this addendum are the same as those described in Section E.3 of the Baseline RA. Brief descriptions of the source and receptor inputs are as follows:

- <u>Source data</u>--The area source type is used in this application. The area source equation in the ISCST model programs is based on the equation for a continuous and finite cross-wind line source. An important

constraint is that the geometry of the source must be a square; however, several square sources may be grouped to approximate the geometry of the actual source, and this group can then be related to a single dust concentration value.

For this application, each source is considered to be equivalent to a site where surface (0- to 2-foot depth) soil contamination is identified. For each source, areal extent and geometry are considered equivalent to those for each site and were previously determined using historic aerial photographs and site reconnaissance. Surface soil (0- to 2-foot depth) is sampled at Sites 2, 12, and 44 Location II during followup fieldwork. However, these sites are not included as sources for the current land use scenario, because they are small areas located far from any receptors, with generally low levels of contaminants detected in surface soil. The potential magnitude of an onsite receptor's exposure to contamination from these sites via inhalation of fugitive dust is, therefore, considered to be small, and the associated risks low. There is some slight overlap for some of the sources (see Figure E-2 of the Baseline RA) because of the approximation of each source by a group of smaller, square sources, and because of the large number of irregularly shaped, closely spaced sites. Finer subdivision of the sources into smaller squares is not appropriate because of time considerations, and because this would have only a negligible impact on the results. The location of the southwest corner of the source and the length of the square source are entered into the program in cartesian coordinates (see Tables E-2 and E-3 in the Baseline RA).

Emission rates are entered for each site based on the values derived in Section E.2 of the Baseline RA. Variable emission rates for the OAWE calculation are calculated internally with each hour of the meteorological data using wind velocity scalars.

- Receptor data--The location of discrete receptors is entered into the program using cartesian coordinates (see Table E-2 in the Baseline RA and Table E-3*; Figure E-2 in the Baseline RA and Figure E-3*). For the current and future land use scenarios, receptors are the same as described in the Baseline RA.

ISCST program control options consist of three general categories:

- Meteorological options--Selected options include hourly data by preprocessed data tape, rural mode, and wind system measurement height.

- Dispersion model options--Selected options include concentration calculations, discrete receptors in cartesian coordinates at ground surface, and fugitive dust emission rates (variable for wind erosion calculations and nonvariable for other erosion scenarios).

- Output options--Selected values to be output include the program control parameters, source data, receptor data, and annual average dust concentrations.

A list of all input data parameter used for this application is provided in Table E-4 of the Baseline RA. It should be noted that additional options do exist, but they are not considered pertinent to the current application.

The shortcomings of the ISCST dispersion model are discussed in the Baseline RA.

E.4* RESULTS

Fugitive dust concentrations calculated for current receptors are listed in Table E-5 in the Baseline RA, and fugitive dust concentrations for possible future receptors are listed in Table E-6*. For both current and possible future receptors, the annual average dust concentration associated with each specific source for each receptor is listed for 5 years (1985-1989).

TABLE E-3
SOURCE AND RECEPTOR LOCATION
FUTURE LANDUSE

		Source		Length	Receptor	
Siteno	Iscno	East	North	meters	X	Y
45I	1	307487	5081295	54	307653.8	5081349
	2	307541	5081295	53		
	3	307487	5081349	53		
	4	307541	5081349	54		
45II	5	308506	5081120	54	308674.9	5081120
	6	308506	5081174	54		
	7	308560	5081174	54		
	8	308560	5081120	54		
31	9	306128	5078766	78	306833.3	5079169
	10	306128	5078845	79		
	11	306128	5078923	78		
	12	306128	5079002	79		
	13	306207	5078766	78		
	14	306207	5078845	79		
	15	306207	5078923	78		
	16	306207	5079002	79		
	17	306285	5078766	78		
	18	306285	5078845	79		
	19	306285	5078923	78		
	20	306285	5079002	79		
	21	306363	5078766	78		
	22	306363	5078845	79		
	23	306363	5078923	78		
	24	306363	5079002	79		
	25	306532	5079054	73		
	26	306532	5079127	73		
	27	306532	5079200	73		
	28	306605	5079054	73		
	29	306605	5079127	73		
	30	306605	5079200	73		
	31	306678	5079054	73		
	32	306678	5079127	73		
	33	306678	5079200	73		
8	34	306416	5078670	54	306530.9	5078697
57III	35	305877	5078249	86	306662.1	5078507
	36	305877	5078335	86		
	37	305877	5078421	86		
	38	305877	5078508	87		
	39	305963	5078249	86		
	40	305963	5078335	86		
	41	305963	5078421	86		
	42	305963	5078508	87		
	43	306049	5078249	86		
	44	306049	5078335	86		
	45	306049	5078421	86		
	46	306049	5078508	87		
	47	306136	5078249	86		
	48	306136	5078335	86		
	49	306136	5078421	86		
	50	306136	5078508	87		
	51	306219	5078335	86		
	52	306219	5078421	86		
	53	306219	5078507	86		
	54	306219	5078594	87		
	55	306305	5078335	86		
	56	306305	5078421	86		
	57	306305	5078507	86		
	58	306305	5078594	87		

		Source		Length	Receptor	
Siteno	Iscno	East	North	eters	X	Y
57III	59	306391	5078335	86		
(Cont.)	60	306391	5078421	86		
	61	306391	5078507	86		
	62	306391	5078594	87		
	63	306477	5078335	86		
	64	306477	5078421	86		
	65	306477	5078507	86		
	66	306477	5078594	87		
60	67	305473	5077909	98	305879.7	5078155
	68	305473	5078007	99		
	69	305571	5077909	98		
	70	305571	5078007	99		
	71	305571	5078155	98		
	72	305571	5078253	99		
	73	305669	5078155	98		
	74	305669	5078253	99		
21	75	305867	5077818	98	306369.5	5078014
	76	305867	5077916	98		
	77	305867	5078014	98		
	78	305867	5078112	98		
	79	305965	5077818	98		
	80	305965	5077916	98		
	81	305965	5078014	98		
	82	305965	5078112	98		
	83	306063	5077818	98		
	84	306063	5077916	98		
	85	306063	5078014	98		
	86	306063	5078112	98		
	87	306161	5077818	98		
	88	306161	5077916	98		
	89	306161	5078014	98		
	90	306161	5078112	98		
38	91	305404	5079241	99	305763.5	5079613
	92	305404	5079340	99		
	93	305404	5079439	99		
	94	305404	5079538	99		
	95	305503	5079241	99		
	96	305503	5079340	99		
	97	305503	5079439	99		
	98	305503	5079538	99		
	99	305602	5079241	99		
	100	305602	5079340	99		
	101	305602	5079439	99		
	102	305602	5079538	99		
	103	305701	5079241	99		
	104	305701	5079340	99		
	105	305701	5079439	99		
	106	305701	5079538	99		
	107	305404	5079613	98		
	108	305404	5079711	99		
	109	305502	5079613	98		
	110	305502	5079711	99		
	111	305606	5079613	74		
	112	305606	5079687	74		
	113	305606	5079761	74		
	114	305680	5079613	74		
	115	305680	5079687	74		
	116	305680	5079761	74		

TABLE E-3 * (cont'd)
SOURCE AND RECEPTOR LOCATION
FUTURE LANDUSE

Siteno	Iscno	Source East	Source North	Length meters	Receptor X	Receptor Y
38	117	305754	5079613	74		
(Cont.)	118	305754	5079687	74		
	119	305754	5079761	74		
	120	305828	5079751	98		
	121	305963	5079773	86		
16	122	305828	5079138	98	306921.7	5079360
	123	305828	5079236	99		
	124	305926	5079138	98		
	125	305926	5079236	99		
	126	305926	5079337	98		
	127	306025	5079143	98		
	128	306025	5079239	98		
	129	306025	5079337	98		
	130	306025	5079433	98		
	131	306123	5079143	98		
	132	306222	5079143	98		
	133	306320	5079143	98		
	134	306320	5079239	98		
	135	306320	5079337	98		
	136	306320	5079433	98		
	137	306222	5079433	98		
	138	306123	5079433	98		
	139	306172	5079532	61		
	140	306172	5079593	62		
	141	306233	5079532	61		
	142	306233	5079593	62		
	143	306296	5079532	61		
	144	306296	5079593	62		
	145	306357	5079532	61		
	146	306357	5079593	62		
	147	306613	5079163	98		
	148	306613	5079261	99		
	149	306711	5079163	98		
	150	306711	5079261	99		
	151	306613	5079360	98		
	152	306613	5079458	99		
	153	306711	5079360	98		
	154	306711	5079458	99		
19	155	306096	5080803	84	306295.7	5080727
	156	306096	5080887	84		
	157	306096	5080971	84		
	158	306096	5081056	85		
	159	306180	5080803	84		
	160	306180	5080887	84		
	161	306180	5080971	84		
	162	306180	5081056	85		
	163	306264	5080803	84		
	164	306264	5080887	84		
	165	306264	5080971	84		
	166	306264	5081056	85		
	167	306349	5080803	84		
	168	306349	5080887	84		
	169	306349	5080971	84		
	170	306349	5081056	85		
	171	306084	5080660	67		
	172	306084	5080727	68		
	173	306151	5080660	67		
	174	306151	5080727	68		

Siteno	Iscno	Source East	Source North	Length eters	Receptor X	Receptor Y
19	175	306084	5080527	67		
(Cont.)	176	306084	5080594	68		
	177	306151	5080527	67		
	178	306151	5080594	68		
	179	306084	5080389	67		
	180	306084	5080456	68		
	181	306151	5080389	67		
	182	306151	5080456	68		
	183	306084	5080259	67		
	184	306084	5080326	68		
	185	306151	5080259	67		
	186	306151	5080326	68		
	187	306084	5080118	67		
	188	306084	5080185	68		
	189	306151	5080118	67		
	190	306151	5080185	68		
18	191	306109	5080490	97	306512.5	5080636
	192	306109	5080587	97		
	193	306109	5080685	98		
	194	306206	5080490	97		
	195	306206	5080587	97		
	196	306206	5080685	98		
	197	306304	5080490	97		
	198	306304	5080587	97		
	199	306304	5080685	98		
56	200	306436	5080222	74	306593.5	5080259
57II	201	305902	5080508	86	306171	5080508
	202	305902	5080594	86		
	203	305988	5080508	86		
	204	305988	5080594	86		
	205	305902	5080308	86		
	206	305902	5080394	86		
	207	305988	5080308	86		
	208	305988	5080394	86		
32II	209	306077	5080210	73	306232.3	5080210
15	210	305768	5080367	60	305358.8	5080428
	211	305768	5080428	61		
	212	305829	5080367	60		
	213	305829	5080428	61		
32II	214	306072	5079832	81	306244.3	5079873
57I	215	305518	5079833	83	306147.4	5079974
	216	305518	5079916	84		
	217	305601	5079833	83		
	218	305601	5079916	84		
	219	305685	5079894	74		
	220	305685	5079968	74		
	221	305759	5079894	74		
	222	305759	5079968	74		
	223	305835	5079921	61		
	224	305835	5079983	62		
	225	305897	5079921	61		
	226	305897	5079983	62		
	227	305958	5079929	89		
13–	228	305645	5079909	64		
	229	305739	5079956	64		
	230	305813	5079956	64		
13	231	305645	5079909	64	305949.2	5079977
	232	305739	5079956	64		

TABLE E-3 * (cont'd)
SOURCE AND RECEPTOR LOCATION
FUTURE LANDUSE

Siteno	Iscno	Source East	Source North	Length meters	Receptor X	Receptor Y
13	233	305813	5079956	64		
17	234	305729	5080039	62	305980.9	5080070
	235	305849	5080039	62		
46	236	306643	5076507	63.4	306777.9	5076546
	237	306643	5076546	63.4		
37	238	306517	5076663	39	306600	5076736
	239	306517	5076736	39		
81	240	307326	5075936	98	307534.5	5076034
	241	307111	5075980	98		
	242	306975	5076029	98		
	243	306770	5076024	73		
	244	306502	5076107	34		
1	245	306097	5076711	73	306252.6	5076748
25	246	306180	5076887	44	306273.6	5077034
	247	306141	5076946	88		
	248	306164	5077048	60		
26	249	306049	5077185	73	306277.3	5077336
	250	306049	5077258	73		
	251	306122	5077185	73		
	252	306122	5077258	73		
	253	306049	5077336	73		
	254	306049	5077409	73		
	255	306122	5077336	73		
	256	306122	5077409	73		
35	257	306800	5077743	29	306861.7	5077758
34	258	307049	5077843	43	307506.3	5077935
	259	307351	5077911	73		
22	260	311604	5075343	61	311856.8	5075350
	261	311666	5075341	61		
	262	311727	5075340	61		
	263	311430	5075311	91		
	264	311521	5075307	91		
52	265	311222	5077546	53	311580.9	5077760
	266	311222	5077599	54		
	267	311275	5077546	53		
	268	311275	5077599	54		
	269	311276	5077648	53		
	270	311276	5077701	54		
	271	311329	5077648	53		
	272	311329	5077701	54		
	273	311339	5077760	53		
	274	311339	5077813	54		
	275	311392	5077760	53		
	276	311392	5077813	54		
	277	311413	5077877	53		
	278	311413	5077930	54		
	279	311466	5077877	53		
	280	311466	5077930	54		
4	281	311213	5077678	85	311393.9	5077721
5	282	311383	5077643	56	311502.1	5077671
47	283	311549	5077682	57	311670.3	5077711
36	284	311549	5077906	31	311614.9	5077921
67	285	311452	5077760	49	311609.2	5077834
	286	311486	5077809	49		
	287	311505	5077858	49		
27	288	311695	5075343	14	311724.7	5075350
48	289	309954	5075571	15	309985.9	5075579
30	290	310003	5075483	15	310034.9	5075491

Siteno	Iscno	Source East	Source North	Length eters	Receptor X	Receptor Y
39a	291	313338	5081622	91	315165.8	5082009
	292	313338	5081713	91		
	293	313338	5081805	92		
	294	313338	5081896	91		
	295	313338	5081987	91		
	296	313338	5082079	92		
	297	313338	5082170	91		
	298	313338	5082261	91		
	299	313338	5082353	92		
	300	313429	5081622	91		
	301	313429	5081713	91		
	302	313429	5081805	92		
	303	313429	5081896	91		
	304	313429	5081987	91		
	305	313429	5082079	92		
	306	313429	5082170	91		
	307	313429	5082261	91		
	308	313429	5082353	92		
	309	313521	5081622	91		
	310	313521	5081713	91		
	311	313521	5081805	92		
	312	313521	5081896	91		
	313	313521	5081987	91		
	314	313521	5082079	92		
	315	313521	5082170	91		
	316	313521	5082261	91		
	317	313521	5082353	92		
	318	313612	5081622	91		
	319	313612	5081713	91		
	320	313612	5081805	92		
	321	313612	5081896	91		
	322	313612	5081987	91		
	323	313612	5082079	92		
	324	313612	5082170	91		
	325	313612	5082261	91		
	326	313612	5082353	92		
	327	313703	5081622	91		
	328	313703	5081713	91		
	329	313703	5081805	92		
	330	313703	5081896	91		
	331	313703	5081987	91		
	332	313703	5082079	92		
	333	313703	5082170	91		
	334	313703	5082261	91		
	335	313703	5082353	92		
	336	313795	5081622	91		
	337	313795	5081713	91		
	338	313795	5081805	92		
	339	313795	5081896	91		
	340	313795	5081987	91		
	341	313795	5082079	92		
	342	313795	5082170	91		
	343	313795	5082261	91		
	344	313795	5082353	92		
	345	313886	5081622	91		
	346	313886	5081713	91		
	347	313886	5081805	92		
	348	313886	5081896	91		

TABLE E-3 * (cont'd)
SOURCE AND RECEPTOR LOCATION
FUTURE LANDUSE

Siteno	Iscno	Source East	Source North	Length meters	Receptor X	Receptor Y
39a	349	313886	5081987	91		
(Cont.)	350	313886	5082079	92		
	351	313886	5082170	91		
	352	313886	5082261	91		
	353	313886	5082353	92		
	354	313977	5081622	91		
	355	313977	5081713	91		
	356	313977	5081805	92		
	357	313977	5081896	91		
	358	313977	5081987	91		
	359	313977	5082079	92		
	360	313977	5082170	91		
	361	313977	5082261	91		
	362	313977	5082353	92		
	363	314069	5081622	91		
	364	314069	5081713	91		
	365	314069	5081805	92		
	366	314069	5081896	91		
	367	314069	5081987	91		
	368	314069	5082079	92		
	369	314069	5082170	91		
	370	314069	5082261	91		
	371	314069	5082353	92		
39b	372	314240	5081598	91		
	373	314240	5081689	91		
	374	314240	5081781	92		
	375	314240	5081872	91		
	376	314240	5081963	91		
	377	314240	5082055	92		
	378	314240	5082146	91		
	379	314240	5082237	91		
	380	314240	5082329	92		
	381	314331	5081598	91		
	382	314331	5081689	91		
	383	314331	5081781	92		
	384	314331	5081872	91		
	385	314331	5081963	91		
	386	314331	5082055	92		
	387	314331	5082146	91		
	388	314331	5082237	91		
	389	314331	5082329	92		
	390	314422	5081598	91		
	391	314422	5081689	91		
	392	314422	5081781	92		
	393	314422	5081872	91		
	394	314422	5081963	91		
	395	314422	5082055	92		
	396	314422	5082146	91		
	397	314422	5082237	91		
	398	314422	5082329	92		
	399	314514	5081598	91		
	400	314514	5081689	91		
	401	314514	5081781	92		
	402	314514	5081872	91		
	403	314514	5081963	91		
	404	314514	5082055	92		
	405	314514	5082146	91		
	406	314514	5082237	91		

Siteno	Iscno	Source East	Source North	Length eters	Receptor X	Receptor Y
39b	407	314514	5082329	92		
(Cont.)	408	314605	5081598	91		
	409	314605	5081689	91		
	410	314605	5081781	92		
	411	314605	5081872	91		
	412	314605	5081963	91		
	413	314605	5082055	92		
	414	314605	5082146	91		
	415	314605	5082237	91		
	416	314605	5082329	92		
	417	314696	5081598	91		
	418	314696	5081689	91		
	419	314696	5081781	92		
	420	314696	5081872	91		
	421	314696	5081963	91		
	422	314696	5082055	92		
	423	314696	5082146	91		
	424	314696	5082237	91		
	425	314696	5082329	92		
	426	314788	5081598	91		
	427	314788	5081689	91		
	428	314788	5081781	92		
	429	314788	5081872	91		
	430	314788	5081963	91		
	431	314788	5082055	92		
	432	314788	5082146	91		
	433	314788	5082237	91		
	434	314788	5082329	92		
	435	314879	5081598	91		
	436	314879	5081689	91		
	437	314879	5081781	92		
	438	314879	5081872	91		
	439	314879	5081963	91		
	440	314879	5082055	92		
	441	314879	5082146	91		
	442	314879	5082237	91		
	443	314879	5082329	92		
	444	314970	5081598	91		
	445	314970	5081689	91		
	446	314970	5081781	92		
	447	314970	5081872	91		
	448	314970	5081963	91		
	449	314970	5082055	92		
	450	314970	5082146	91		
	451	314970	5082237	91		
	452	314970	5082329	92		
25b	453	310715	5079891	84	311137.7	5079933
	454	310798	5079891	84		
	455	310876	5079891	84		
	456	310959	5079891	84		
14	457	305510	5079655	52	305620.6	5079681
14–	458	305510	5079655	52		
53	459	312028	5076697	68	312172.7	5076697
	460	312028	5076645	68		
9	6	307930	5080671	97	308389.0	5080876
	7	307930	5080768	98		
	8	307930	5080866	97		
	9	308027	5080842	61		

TABLE E-3 * (cont'd)
SOURCE AND RECEPTOR LOCATION
FUTURE LANDUSE

Siteno	Iscno	Source East	Source North	Length meters	Receptor X	Receptor Y
9	10	308027	5080903	61		
(Cont.)	11	308088	5080842	61		
	12	308088	5080903	61		
	13	308027	5080720	61		
	14	308027	5080781	61		
	15	308088	5080720	61		
	16	308088	5080781	61		
	17	308149	5080705	73		
	18	308149	5080778	73		
	19	308222	5080705	73		
	20	308222	5080778	73		
	21	308149	5080852	73		
	22	308149	5080925	73		
	23	308222	5080852	73		
	24	308222	5080925	73		
10	25	310998	5081061	73	312064.0	5081277
	26	311003	5081134	73		
	27	311076	5081090	83		
	28	310613	5081256	49		
	29	310662	5081256	49		
	30	310866	5081256	49		
	31	310915	5081256	49		
	32	310964	5081256	49		
	33	311013	5081256	49		
	34	311062	5081256	49		
	35	311111	5081256	49		
	36	311160	5081256	49		
	37	311209	5081256	49		
	38	311258	5081256	49		
	39	311307	5081256	49		
	40	311358	5081256	49		
	41	311405	5081256	49		
	42	311454	5081256	49		
	43	311503	5081261	49		
	44	311552	5081261	49		
	45	311601	5081261	49		
	46	311650	5081261	49		
	47	311699	5081261	49		
	48	311748	5081266	49		
	49	311797	5081266	49		
	50	311846	5081266	49		
	51	311895	5081266	49		
	52	311944	5081271	49		
41	1	305838	5080985	40	306090.0	5081010
	2	305838	5081022	40		
	3	305877	5080970	86		
	4	305963	5080963	74		
	5	306039	5080988	25		
12	264	311242	5075161	66	311252.0	5075683
	265	311242	5075227	66		
	266	311308	5075161	66		
	267	311308	5075227	66		
	268	310960	5075366	90		
	269	310960	5075456	90		
	270	311050	5075366	90		
	271	311050	5075456	90		
	272	310862	5075463	83		
	273	310930	5075566	78		
12	274	310930	5075644	78		
(Cont.)	275	310930	5075722	78		
	276	311008	5075566	78		
	277	311008	5075644	78		
	278	311008	5075722	78		
	279	311086	5075566	78		
	280	311086	5075644	78		
	281	310886	5075722	78		
	282	310886	5075892	83		
	283	311086	5076024	83		
2	1	308745	5077682	20	308765.0	5077702.0
44	264	311818	5075143	81	312466.7	5075143.0
	265	311899	5075143	81		
	266	311980	5075143	81		
	267	312061	5075143	81		
	268	312142	5075143	81		
	269	312224	5075143	81		
	270	312305	5075143	81		
	271	311818	5075062	81		
	272	311899	5075062	81		
	273	311980	5075062	81		
	274	312061	5075062	81		
	275	312142	5075062	81		
	276	312224	5075062	81		
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	279	311899	5074980	81		
	280	311980	5074980	81		
	281	312061	5074980	81		
	282	312142	5074980	81		
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	284	312305	5074980	81		
	285	311980	5074899	81		
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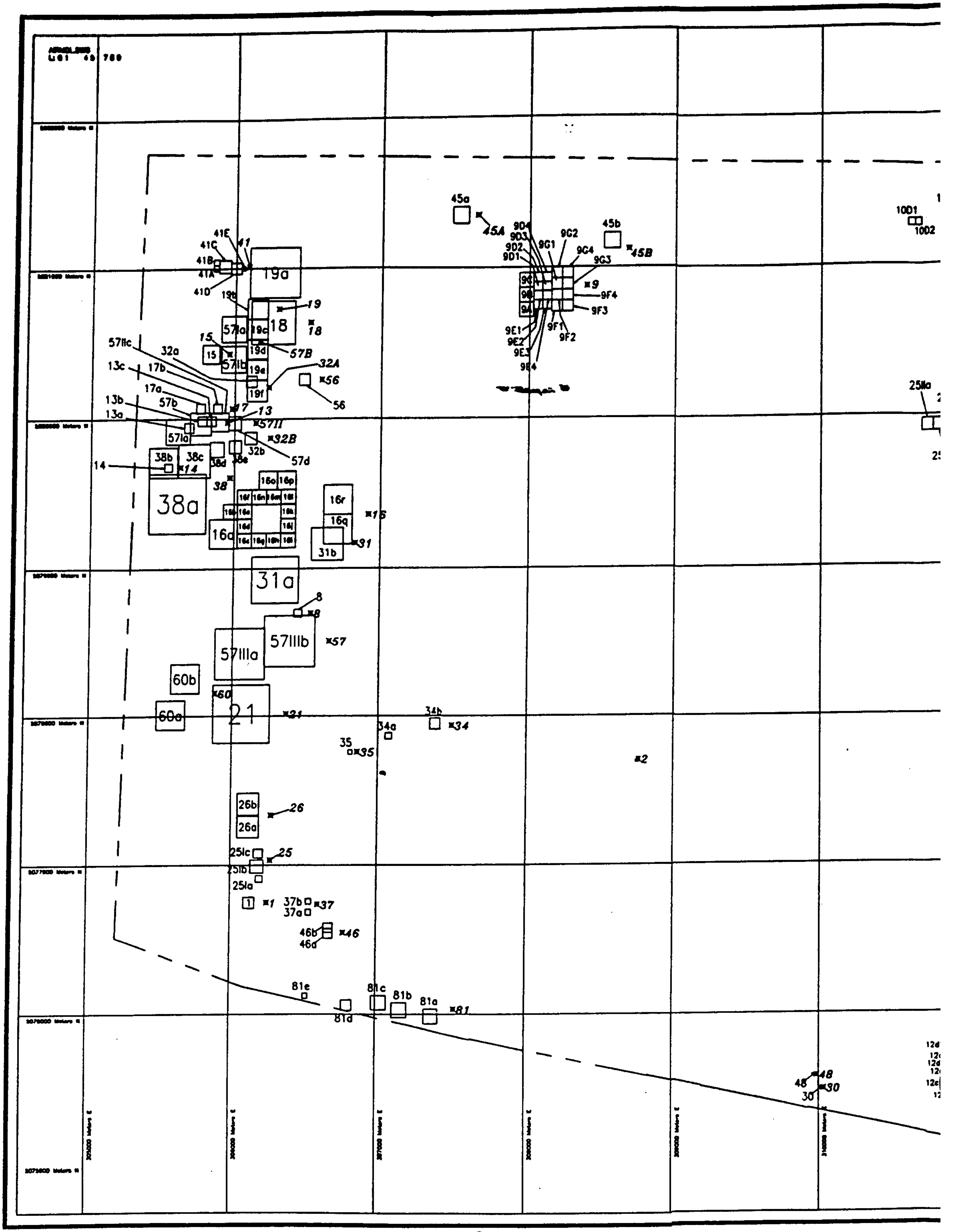

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57IIc
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25Ib
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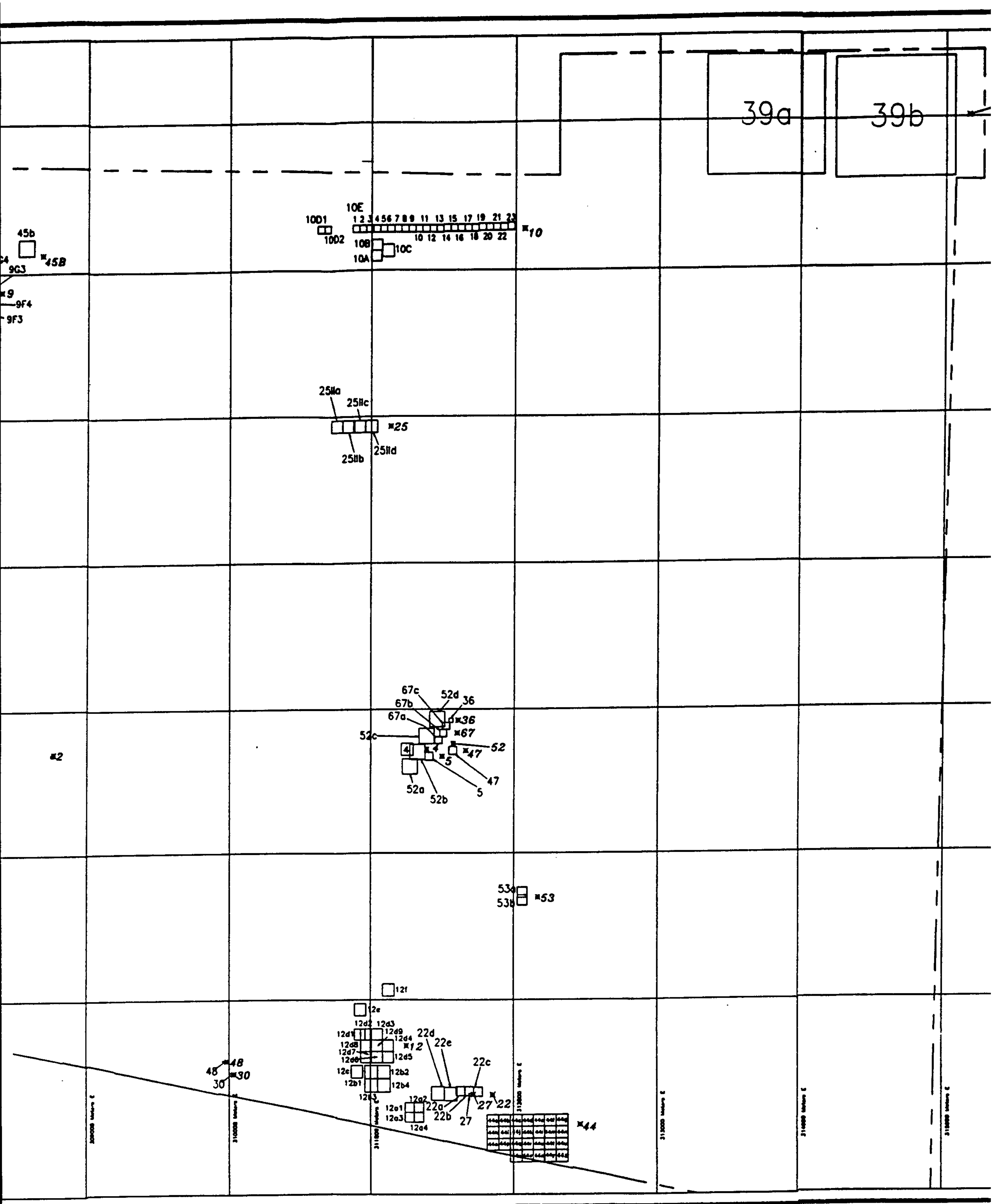
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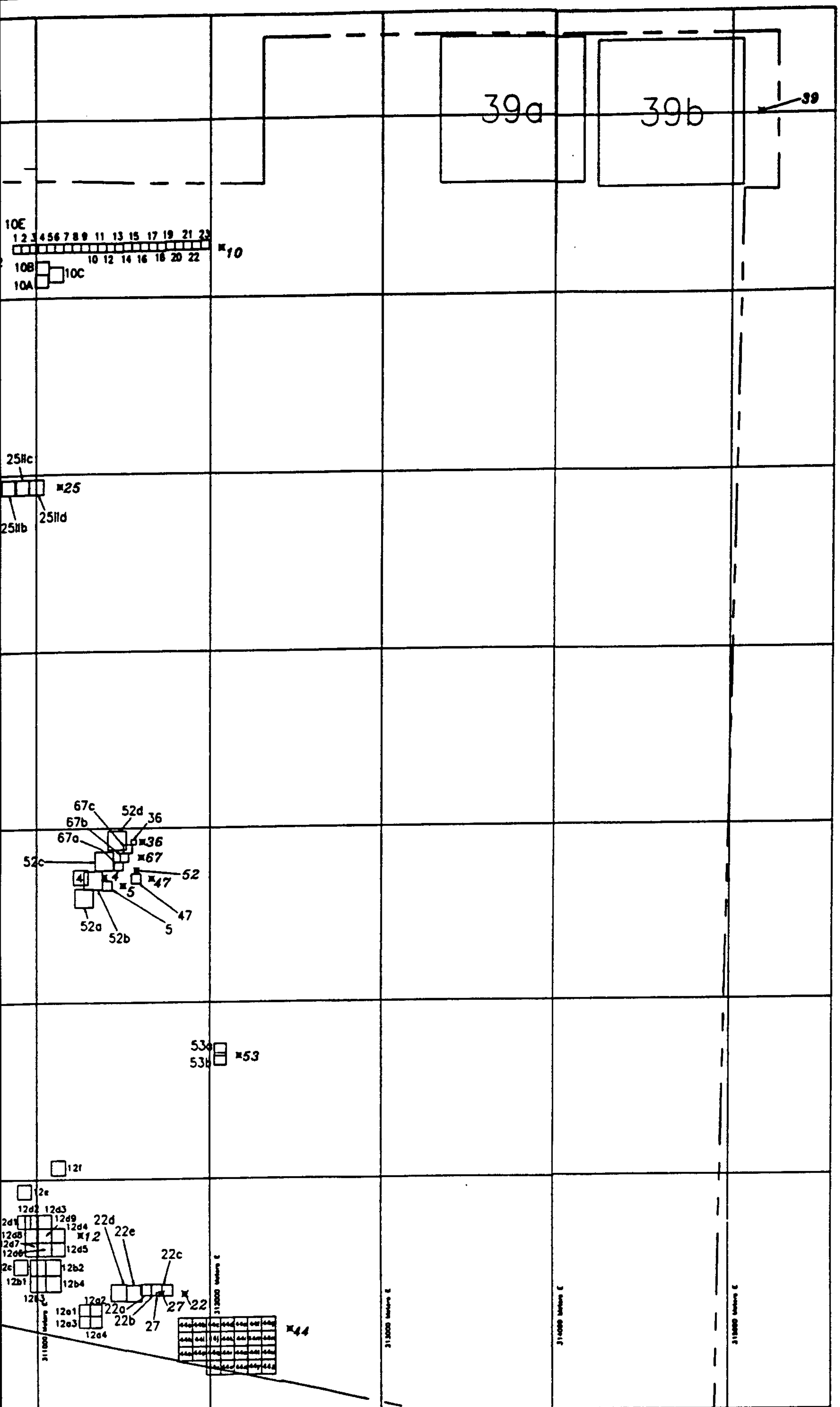

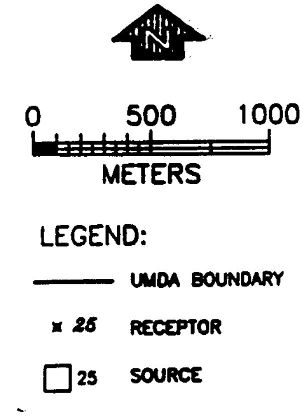

FIGURE E-3*
SOURCES AND RECEPTORS
FOR THE FUTURE
LAND USE SCENARIO

A-RA
E-12

DAMES & MOORE

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TABLE E-6*

UMATILLA AIR MODELING: FUTURE ANNUAL AVERAGE AND MAXIMUM ANNAUL AVERAGE DUST CONCENTRATIONS (UG/M^3)

WIND EROSION

FUTURE RESIDENTIAL LAND USE SCENARIO

siteno	1989	1988	1987	1986	1985	maximum
45 II	2.559	3.473	1.875	2.350	2.107	3.473
45 I	1.383	1.634	0.942	1.186	1.173	1.634
31	4.386	6.365	3.404	4.097	3.483	6.365
8	1.210	1.633	0.873	1.127	1.002	1.633
57 III	6.373	8.832	4.750	5.869	5.161	8.832
60	2.137	2.890	1.615	1.924	1.729	2.890
21	4.870	6.668	3.606	4.456	3.958	6.668
38	8.511	10.658	6.010	7.350	6.658	10.658
16	4.970	6.788	3.643	4.564	4.036	6.788
19	3.672	4.681	2.595	3.118	2.723	4.681
18	3.800	5.288	2.833	3.506	3.089	5.288
56	1.240	1.670	0.894	1.156	1.027	1.670
57 I	2.432	3.308	1.845	2.203	1.928	3.308
32a	0.788	1.055	0.617	0.784	0.791	1.055
15	2.542	3.448	1.862	2.334	2.096	3.448
32b	1.264	1.708	0.914	1.179	1.047	1.708
57 II	3.261	4.377	2.308	3.052	2.683	4.377
13	2.030	2.601	1.382	1.865	1.699	2.601
17	1.626	2.137	1.150	1.500	1.347	2.137
46	0.881	1.266	0.617	0.747	0.694	1.266
37	0.357	0.437	0.233	0.297	0.280	0.437
81	0.726	1.153	0.539	0.614	0.550	1.153
1	0.563	0.866	0.403	0.488	0.438	0.866
25I	0.796	1.305	0.614	0.696	0.615	1.305
26	1.233	1.936	0.925	1.062	0.958	1.936
35	0.505	0.780	0.364	0.438	0.392	0.780
34	0.570	0.842	0.384	0.493	0.444	0.842
22	1.247	1.589	0.773	1.022	0.986	1.589
52	0.705	1.106	0.536	0.612	0.547	1.106
4	0.572	0.880	0.409	0.496	0.445	0.880
5	0.543	0.835	0.388	0.472	0.423	0.835
47	0.545	0.839	0.391	0.473	0.424	0.839
36	0.502	0.767	0.356	0.436	0.390	0.767
67	0.593	0.978	0.452	0.525	0.461	0.978
27	0.448	0.687	0.319	0.389	0.348	0.687
48	0.454	0.702	0.328	0.393	0.352	0.702
30	0.454	0.702	0.328	0.393	0.352	0.702
39	4.437	6.901	3.290	3.826	3.420	6.901
25II	1.233	1.795	0.836	1.038	0.953	1.795
14	0.535	0.821	0.382	0.464	0.416	0.821
53	0.844	1.238	0.606	0.708	0.655	1.238
9	4.773	6.611	3.550	4.412	3.831	6.611
10	2.798	3.196	1.856	2.468	2.398	3.196
41	3.959	5.384	2.913	3.678	3.203	5.384
2	0.354	0.731	0.377	0.322	0.218	0.731
44	3.239	5.181	2.548	2.786	2.427	5.181
12	1.696	2.681	1.292	1.467	1.298	2.681

TABLE E-6* (CONT.)

UMATILLA AIR MODELING: FUTURE ANNUAL AVERAGE AND MAXIMUM ANNAUL AVERAGE DUST CONCENTRATIONS (UG/M^3)

HEAVY CONSTRUCTION

siteno	1989	1988	1987	1986	1985	maximum
45 II	84.741	95.171	98.351	102.889	99.552	102.889
45 I	74.672	79.514	83.482	90.165	86.806	90.165
31	177.177	204.028	214.177	221.964	208.193	221.964
8	31.210	35.912	34.977	37.952	37.533	37.952
57 III	241.969	271.130	282.603	295.996	282.370	295.996
60	115.607	128.991	137.305	143.057	134.399	143.057
21	206.554	229.886	241.826	253.387	240.963	253.387
38	710.292	718.383	794.223	818.396	809.769	818.396
16	203.566	225.862	235.146	249.083	236.217	249.083
19	377.984	365.693	418.174	431.674	421.116	431.674
18	146.381	165.976	171.770	181.539	172.016	181.539
56	32.250	37.115	36.115	39.296	38.748	39.296
57 I	143.761	158.077	167.497	178.095	166.409	178.095
32a	31.111	33.121	34.216	36.982	35.847	36.982
15	83.379	93.557	96.815	101.128	97.948	101.128
32b	32.537	37.515	36.551	39.619	39.096	39.619
57 II	100.189	111.760	108.054	119.885	118.849	119.885
13	50.956	56.171	55.068	61.673	60.530	61.673
17	39.693	44.930	43.590	47.957	47.466	47.957
46	41.740	69.364	28.392	73.597	71.666	73.597
37	45.623	47.995	51.965	55.954	52.840	55.954
81	45.224	51.536	53.486	55.309	53.158	55.309
1	32.074	36.979	36.038	39.058	38.549	39.058
25I	111.334	118.570	127.085	134.789	127.087	134.789
26	148.815	163.339	173.551	183.039	172.049	183.039
35	28.771	33.236	32.514	35.106	34.672	35.106
34	34.056	37.817	37.005	41.636	40.346	41.636
22	68.595	73.395	73.269	81.985	82.041	82.041
52	88.011	96.946	104.762	109.892	105.215	109.892
4	32.564	37.534	36.551	39.648	39.117	39.648
5	30.934	35.571	34.612	37.611	37.183	37.611
47	30.999	35.740	34.852	37.761	37.279	37.761
36	27.863	32.644	31.669	34.606	34.336	34.606
67	58.330	65.122	67.987	71.584	67.642	71.584
27	25.201	28.881	28.081	30.650	30.342	30.650
48	25.445	29.441	28.818	31.129	30.679	31.129
30	25.445	29.441	28.818	31.129	30.679	31.129
39	481.084	528.593	552.667	588.111	561.815	588.111
25II	62.202	69.532	67.259	74.764	73.947	74.764
14	30.331	34.853	33.895	36.874	36.453	36.874
53	60.920	68.515	70.508	73.972	71.290	73.972
9	182.231	205.471	213.104	226.161	212.436	226.161
10	63.396	67.892	66.344	74.355	76.910	76.910
41	110.437	127.097	131.500	136.556	132.578	136.556
2	83.243	89.445	95.651	98.453	91.119	98.453
44	490.239	524.005	556.276	581.325	560.008	581.325
12	215.046	234.940	247.709	260.357	249.966	260.357

TABLE E-6* (CONT.)

UMATILLA AIR MODELING: FUTURE ANNUAL AVERAGE AND MAXIMUM ANNAUL AVERAGE DUST CONCENTRATIONS (UG/M^3)

COMBINED WIND EROSION AND HEAVY CONSTRUCTION FUTURE LIGHT INDUSTRIAL, MILITARY, AND CONSTRUCTION LAND USE SCENARIO

siteno	1989	1988	1987	1986	1985	maximum
45 II	87.300	98.644	100.226	105.239	101.659	105.239
45 I	76.055	81.148	84.424	91.351	87.978	91.351
31	181.563	210.393	217.581	226.060	211.676	226.060
8	32.419	37.545	35.850	39.079	38.534	39.079
57 III	248.342	279.962	287.353	301.865	287.531	301.865
60	117.744	131.881	138.920	144.980	136.128	144.980
21	211.425	236.553	245.433	257.844	244.921	257.844
38	718.803	729.041	800.233	825.746	816.426	825.746
16	208.536	232.649	238.789	253.647	240.253	253.647
19	381.656	370.375	420.768	434.792	423.839	434.792
18	150.182	171.264	174.602	185.045	175.106	185.045
56	33.490	38.785	37.008	40.452	39.775	40.452
57 I	146.193	161.385	169.342	180.298	168.337	180.298
32a	31.898	34.176	34.833	37.766	36.638	37.766
15	85.922	97.005	98.677	103.463	100.044	103.463
32b	33.802	39.222	37.465	40.798	40.143	40.798
57 II	103.450	116.136	110.361	122.937	121.532	122.937
13	52.986	58.773	56.450	63.538	62.228	63.538
17	41.319	47.067	44.739	49.458	48.813	49.458
46	42.621	70.629	29.010	74.344	72.359	74.344
37	45.980	48.432	52.198	56.251	53.120	56.251
81	45.951	52.688	54.025	55.923	53.709	55.923
1	32.637	37.845	36.441	39.547	38.987	39.547
25I	112.131	119.874	127.699	135.485	127.702	135.485
26	150.048	165.275	174.476	184.101	173.007	184.101
35	29.276	34.016	32.877	35.544	35.064	35.544
34	34.626	38.659	37.389	42.129	40.790	42.129
22	69.842	74.984	74.043	83.007	83.027	83.027
52	88.716	98.051	105.298	110.504	105.762	110.504
4	33.136	38.414	36.960	40.145	39.562	40.145
5	31.477	36.405	35.000	38.083	37.606	38.083
47	31.544	36.579	35.243	38.234	37.703	38.234
36	28.365	33.411	32.024	35.042	34.726	35.042
67	58.923	66.100	68.438	72.109	68.103	72.109
27	25.649	29.568	28.400	31.039	30.690	31.039
48	25.899	30.143	29.146	31.523	31.031	31.523
30	25.899	30.143	29.146	31.523	31.031	31.523
39	485.521	535.494	555.957	591.937	565.235	591.937
25II	63.436	71.327	68.095	75.802	74.900	75.802
14	30.865	35.674	34.277	37.338	36.869	37.338
53	61.764	69.753	71.114	74.680	71.945	74.680
9	187.003	212.081	216.654	230.572	216.267	230.572
10	66.194	71.088	68.200	76.823	79.308	79.308
41	114.396	132.481	134.413	140.234	135.781	140.234
2	83.597	90.175	96.028	98.775	91:337	98.775
44	493.479	529.186	558.824	584.110	562.435	584.110
12	216.741	237.621	249.001	261.825	251.265	261.825

TABLE E-6* (CONT.)

UMATILLA AIR MODELING: FUTURE ANNUAL AVERAGE AND MAXIMUM ANNAUL AVERAGE DUST CONCENTRATIONS (UG/M^3)

AGRICULTURAL TILLING

siteno	1989	1988	1987	1986	1985	maximum
45 II	0.097	0.108	0.112	0.117	0.113	0.117
45 I	0.085	0.091	0.095	0.103	0.099	0.103
31	0.202	0.233	0.244	0.253	0.237	0.253
8	0.036	0.041	0.040	0.043	0.043	0.043
57 III	0.276	0.309	0.322	0.337	0.322	0.337
60	0.132	0.147	0.157	0.163	0.153	0.163
21	0.235	0.262	0.276	0.289	0.275	0.289
38	0.810	0.819	0.905	0.933	0.923	0.933
16	0.232	0.257	0.268	0.284	0.269	0.284
19	0.431	0.417	0.477	0.492	0.480	0.492
18	0.167	0.189	0.196	0.207	0.196	0.207
56	0.037	0.042	0.041	0.045	0.044	0.045
57 I	0.164	0.180	0.191	0.203	0.190	0.203
32a	0.035	0.038	0.039	0.042	0.041	0.042
15	0.095	0.107	0.110	0.115	0.112	0.115
32b	0.037	0.043	0.042	0.045	0.045	0.045
57 II	0.114	0.127	0.123	0.137	0.135	0.137
13	0.058	0.064	0.063	0.070	0.069	0.070
17	0.045	0.051	0.050	0.055	0.054	0.055
46	0.048	0.079	0.032	0.084	0.082	0.084
37	0.052	0.055	0.059	0.064	0.060	0.064
81	0.052	0.059	0.061	0.063	0.061	0.063
1	0.037	0.042	0.041	0.045	0.044	0.045
25I	0.127	0.135	0.145	0.154	0.145	0.154
26	0.170	0.186	0.198	0.209	0.196	0.209
35	0.033	0.038	0.037	0.040	0.040	0.040
34	0.039	0.043	0.042	0.047	0.046	0.047
22	0.078	0.084	0.084	0.093	0.094	0.094
52	0.100	0.111	0.119	0.125	0.120	0.125
4	0.037	0.043	0.042	0.045	0.045	0.045
5	0.035	0.041	0.039	0.043	0.042	0.043
47	0.035	0.041	0.040	0.043	0.042	0.043
36	0.032	0.037	0.036	0.039	0.039	0.039
67	0.066	0.074	0.078	0.082	0.077	0.082
27	0.029	0.033	0.032	0.035	0.035	0.035
48	0.029	0.034	0.033	0.035	0.035	0.035
30	0.029	0.034	0.033	0.035	0.035	0.035
39	0.548	0.603	0.630	0.670	0.640	0.670
25II	0.071	0.079	0.077	0.085	0.084	0.085
14	0.035	0.040	0.039	0.042	0.042	0.042
53	0.069	0.078	0.080	0.084	0.081	0.084
9	0.208	0.234	0.243	0.258	0.242	0.258
10	0.072	0.077	0.076	0.085	0.088	0.088
41	0.126	0.145	0.150	0.156	0.151	0.156
2	0.116	0.125	0.134	0.138	0.128	0.138
44	0.686	0.733	0.779	0.814	0.784	0.814
12	0.301	0.329	0.347	0.364	0.350	0.364

TABLE E–6* (CONT.)

UMATILLA AIR MODELING: FUTURE ANNUAL AVERAGE AND MAXIMUM ANNAUL AVERAGE DUST CONCENTRATIONS (UG/M^3)

COMBINED AGRICULTURAL TILLING AND WIND EROSION FUTURE AGRICULTURAL (FARMER) LAND USE SCENARIO

siteno	1989	1988	1987	1986	1985	maximum
45 II	2.655	3.581	1.987	2.467	2.221	3.581
45 I	1.468	1.725	1.037	1.289	1.272	1.725
31	4.588	6.598	3.648	4.350	3.721	6.598
8	1.245	1.674	0.913	1.170	1.044	1.674
57 III	6.649	9.141	5.072	6.207	5.483	9.141
60	2.269	3.037	1.772	2.087	1.882	3.037
21	5.106	6.930	3.882	4.745	4.233	6.930
38	9.320	11.477	6.916	8.283	7.581	11.477
16	5.203	7.045	3.911	4.848	4.305	7.045
19	4.103	5.098	3.071	3.610	3.203	5.098
18	3.967	5.478	3.028	3.713	3.285	5.478
56	1.277	1.713	0.935	1.201	1.071	1.713
57 I	2.596	3.488	2.036	2.406	2.117	3.488
32a	0.823	1.092	0.656	0.826	0.831	1.092
15	2.637	3.555	1.972	2.450	2.208	3.555
32b	1.301	1.750	0.956	1.224	1.091	1.750
57 II	3.376	4.504	2.431	3.189	2.819	4.504
13	2.088	2.665	1.445	1.935	1.768	2.665
17	1.671	2.188	1.199	1.555	1.401	2.188
46	0.928	1.345	0.650	0.831	0.775	1.345
37	0.409	0.492	0.292	0.361	0.340	0.492
81	0.778	1.211	0.600	0.677	0.611	1.211
1	0.600	0.908	0.444	0.533	0.482	0.908
25I	0.923	1.440	0.759	0.850	0.760	1.440
26	1.403	2.122	1.123	1.271	1.154	2.122
35	0.538	0.818	0.401	0.478	0.432	0.818
34	0.608	0.885	0.426	0.541	0.490	0.885
22	1.325	1.673	0.857	1.115	1.079	1.673
52	0.805	1.216	0.656	0.737	0.667	1.216
4	0.609	0.922	0.451	0.542	0.489	0.922
5	0.579	0.875	0.427	0.514	0.465	0.875
47	0.580	0.880	0.431	0.516	0.466	0.880
36	0.533	0.805	0.392	0.475	0.429	0.805
67	0.660	1.052	0.529	0.606	0.539	1.052
27	0.477	0.720	0.351	0.424	0.382	0.720
48	0.483	0.736	0.361	0.429	0.387	0.736
30	0.483	0.736	0.361	0.429	0.387	0.736
39	4.985	7.504	3.920	4.497	4.060	7.504
25II	1.304	1.874	0.912	1.123	1.037	1.874
14	0.569	0.861	0.420	0.506	0.457	0.861
53	0.914	1.316	0.686	0.792	0.736	1.316
9	4.981	6.845	3.793	4.669	4.073	6.845
10	2.870	3.273	1.931	2.552	2.486	3.273
41	4.085	5.529	3.063	3.834	3.355	5.529
2	0.470	0.856	0.511	0.460	0.346	0.856
44	3.925	5.914	3.327	3.599	3.211	5.914
12	1.997	3.010	1.638	1.832	1.648	3.010

For each possible future receptor, the fugitive dust concentration associated with the adjacent source is listed in Table E-6* for wind erosion, agricultural tilling, and heavy construction. Fugitive dust concentrations are also listed for combined wind and agricultural tilling erosion and for combined wind and heavy construction erosion. Wind erosion dominates the fugitive dust concentration for agriculture, while heavy construction erosion dominates the fugitive dust concentration for construction. Wind erosion dominates the agricultural scenario but not the construction scenario, because tilling operations are not continuous, while construction occurs for 40 plus hours per week for many weeks.

A list of key assumptions and variables that contribute to uncertainties for emission rates and ISCST dispersion results is contained in Table E-7 in the Baseline RA.